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Haley & Aldrich, Inc.

REPORT ON
PHASE TWO OIL AND HAZARDOUS MATERIAL SITE EVALUATION
PARCEL 18 AND PARCEL 18B
BOSTON, MASSACHUSETTS

VOLUME I

Consulting

Geotechnical Eng

Geologists and

Hydrogeologists

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PHASE TWO OIL AND HAZARDOUS MATERIAL SITE EVALUATION
PARCEL 18 AND PARCEL 18B
BOSTON, MASSACHUSETTS

VOLUME I

by

Haley & Aldrich, Inc.
Cambridge, Massachusetts

for

Frederick R. Harris, Inc.
Boston, Massachusetts

File No. 10003-41

October 1989

Haley & Aldrich, Inc.

Consulting
Geotechnical Engineers
Geologists and
Hydrogeologists

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30 October 1989
File No. 10003-41

Frederick R. Harris, Inc.
66 Long Wharf
Boston, Massachusetts 02110

Attention: Mr. Thomas McManus, P.E.

Subject: Phase Two Oil and Hazardous Material
Site Evaluation
Parcel 18 and Parcel 18B
Boston, Massachusetts

Gentlemen:

We are please to present our final report of a Phase Two Oil and Hazardous Material Site Evaluation conducted at Parcel 18 and Parcel 18B in Boston, Massachusetts.

Please do not hesitate to contact us should you have any questions concerning this report. It has been a pleasure to be of service to you.

Sincerely yours,
HALEY & ALDRICH, INC.

D. Todd Coffin
Staff Environmental Geologist

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EXECUTIVE SUMMARY

A Phase Two Oil and Hazardous Material Site Evaluation has been conducted at Parcel 18 and Parcel 18B located in the Roxbury section of Boston, Massachusetts. The purpose of the Phase Two study has been to evaluate the source(s), nature and extent of oil or hazardous materials at the site, identify possible exposure of human or environmental receptors to contaminants, and characterize the risk of harm to human health and the environment. The study was conducted based on the Phase Two Work Scope and Sampling Plan and follows the guidelines of the Massachusetts Contingency Plan. A Waiver Application for the site was approved by the Massachusetts Department of Environmental Quality Engineering, which has since been renamed Department of Environmental Protection (DEP), on 31 January 1989.

In 1814 the site was an undeveloped tract of land between Roxbury Crossing and the Boston Back Bay shoreline. Commercial development in the site area began in the late 1880s and continued throughout the first quarter of the 20th Century. Several businesses on site were identified as potential sources of contamination including laundries, a machine shop and other light manufacturing operations. Gas stations were identified at six locations on site. Documentation on whether underground fuel storage tanks were abandoned in place or removed has not been identified. By the late 1970s, all structures on site were razed for proposed highway development.

Evaluation of site geologic conditions and the nature and extent of soil and groundwater contamination was conducted through a subsurface exploration program consisting of soil vadose sampling, a magnetometer survey, test pits, test borings and observation well installation. Soils and groundwater were sampled for chemical analysis including testing for volatile organic compounds, semivolatile organic compounds, petroleum hydrocarbons, metals, pesticides, PCBs and cyanide. Data obtained from the testing program were utilized for evaluation of the risk of harm to human health or the environment posed by the site.

Subsurface exploration has indicated that fill materials and natural sands on site are underlain by a thick clay stratum which is expected to inhibit the downward movement of groundwater. Horizontal groundwater flow is generally westward toward Ruggles Street Station and radially toward a slight depression in the groundwater table near the southeast corner of the site.

Chemical test data have indicated that site soils have been contaminated primarily by petroleum hydrocarbons including gasoline, kerosene, fuel oil and lubricating oils and low levels of pesticides which appear to be randomly distributed throughout much of the soils on site. The contamination is likely to have resulted from fill materials brought on site and former on-site commercial and light manufacturing operations. Metals and semivolatile organic compounds composed primarily of PAHs were also detected in site soils at levels typically found in urban fill. One PCB compound was detected in one surface soil composite sample and was likely a component of the fill which was brought on site.

Groundwater at the site was found to contain generally low levels of petroleum hydrocarbons, associated volatile organic compounds, metal and pesticides. In most instances the groundwater meets drinking water guidelines or standards available for selected compounds.

Three underground storage tanks have been identified on Parcel 18 and one underground tank is suspected to be present on Parcel 18B, in the vicinity of the former Tremont Fuel Company. Approximately 1 to 1.6 ft. of phase-separated petroleum product was observed in an observation well in proximity to the suspected tank location and a test pit where soils were found to contain kerosene.

A preliminary evaluation of treatment and disposal options for excavated soils indicates that special handling of contaminated materials would be costly and would likely impose substantial delays during construction. There is also uncertainty as to whether any given treatment or disposal plan would be approved by environmental agencies of the Commonwealth. Time and cost impacts due to special handling of contaminated soils would be minimized by development which limits excavation of soils, and allows for on-site reuse of all excavated material such as an at-grade construction scheme.

The risk assessment conducted by Meta Systems, Inc., characterized the risk of harm to human health, safety, public welfare and the environment from contamination at the site. The assessment evaluated several exposure scenarios based on stages of proposed site development involving at-grade construction and minimal soils excavation. It was concluded

by Meta Systems, Inc., that risks to human health or the environment associated with the site in its present condition, during construction and after construction do not exceed DEP benchmarks for acceptable risk.

Based on the findings of the risk assessment, it was recommended that dust control measures be implemented during construction to reduce levels of risk associated with metals concentrations in soils, and that risks to children in the proposed play area on site be minimized by removal of contaminated soils or construction of a physical ground barrier, such as a cement cap, over contaminated soils. The Phase Two study recommends that the three underground storage tanks identified on Parcel 18 be removed as required by law, and that further investigation be conducted at Parcel 18B where phase-separated petroleum product was observed and an underground storage tank is suspected to be present.

It was also recommended that construction activities on site be monitored to identify heavily contaminated soils which may require special handling. In addition, since low concentrations of a variety of contaminants have been detected throughout the site and off-site disposal of excavated soils would require extensive testing and could be costly, it was recommended that excavated soils with low levels of contamination be reused on site as much as possible.

Prior to development, a final remedial response plan must be developed for the site which involves a feasibility study of alternative remedial action alternatives. DEP requires this work to be conducted under Phase Three of the Massachusetts Contingency Plan.

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I. INTRODUCTION

1-01. GENERAL

This report presents the results of a Phase Two Oil and Hazardous Material Site Evaluation for Parcel 18 and Parcel 18B in Boston, Massachusetts, hereafter referred to as the "site". The work performed by Haley & Aldrich, Inc., has been carried out in accordance with our proposal to Frederick R. Harris, Inc., dated 28 October 1988 (revised 9 November 1988). Simultaneous geotechnical studies have been carried out for Metropolitan/Columbia Plaza Venture to assist in planning for future site development.

1-02. PURPOSE AND SCOPE

The Preliminary Oil and Hazardous Material Site Evaluation conducted by Haley & Aldrich, Inc., summarized information on site history and development, and evaluated soil screening data obtained from drilling of four test borings at the site. These borings were conducted primarily to evaluate soil conditions for geotechnical engineering purposes. The preliminary study indicated that petroleum contamination was likely to be present in soils and groundwater as a result of the former presence of automobile service stations at the site and evidence of volatile organic compounds in soils based on screening data. The purpose of the Phase Two study has been to evaluate the source(s), nature and extent of oil or hazardous materials in the site environment, identify possible exposure of human or environmental receptors to contaminants, characterize the risk of harm to human health and the environment, and provide a preliminary evaluation of soil treatment/disposal options. The primary elements of the Phase Two evaluation include the following:

- Additional site history research to document changes in land use over time and to identify possible contaminant types and sources.
- A magnetometer survey to assist in identifying locations of underground storage tanks.
- Soil vadose zone monitoring to provide an indication of the presence, nature and extent of volatile organic compounds.
- Excavation of test pits to characterize fill materials, document visual evidence of soil contamination and to

supplement information on the possible presence of underground storage tanks.

- Monitoring drilling of test borings and installation of groundwater observation wells to provide recommendations for soil sampling and placement of well screens.

- Screening of soil samples for relative concentrations of volatile organic compounds with a photoionization detector.

- Random sampling of surface soils to evaluate soil quality and the potential risk from exposure to contaminants in surface soils.

- Laboratory testing of selected soil and groundwater samples to identify types and concentrations of specific oil and hazardous materials.

- An assessment of the risk of harm to human health and the environment from oil and hazardous materials by a risk assessment consultant.

- A preliminary evaluation of soil treatment/disposal options including consideration of at-grade and below-grade site development options.

The study documented herein is based on the Work Plan for Phase Two Oil and Hazardous Material Site Evaluation and has been conducted following the guidelines of 310 CMR 40.00, the Massachusetts Contingency Plan (MCP) (1)*. The MCP, which is summarized in Appendix B, outlines the procedures that must be followed in order to satisfy regulatory requirements for study and remediation of sites where oil or hazardous material releases have occurred. The site is classified by the Massachusetts Department of Environmental Protection (DEP, formerly DEQE) as a non-priority hazardous material release site (No. 3-0739). A Waiver Application was approved for the site by DEQE on 31 January 1989, thus studies and site remediation may proceed according to the MCP without DEP oversight.

1-03. LIMITATIONS

This report has been prepared for the exclusive use of Frederick R. Harris, Inc., and the Massachusetts Bay Transportation Authority (MBTA). The conclusions provided by Haley & Aldrich, Inc., are based soley on the scope of work conducted and sources

* Refer to References listed in Appendix A.

of information referenced in this report and the 26 September 1988 preliminary report. Any additional information that becomes available concerning this site should be provided to Haley & Aldrich, Inc., so that our conclusions may be reviewed and modified as necessary.

The work performed by Haley & Aldrich, Inc., is subject to the terms and conditions stated in our proposal to Frederick R. Harris, Inc., dated 28 October 1988 (revised 9 November 1988). This work has been undertaken in accordance with generally accepted consulting engineering practices. No other warranty, express or implied, is made.

The contents of this report may not be copied, provided or otherwise communicated to any party other than Frederick R. Harris, Inc., Metropolitan/Columbia Plaza Venture, and the MBTA without the prior consent of Haley & Aldrich, Inc. Such permission will not be unreasonably withheld or delayed.

II. SITE LOCATION, HISTORY AND EXISTING CONDITIONS

2-01. SITE LOCATION

The site consists of two parcels of land known as Parcel 18 and Parcel 18B. The parcels are located in the Roxbury section of Boston, Massachusetts, adjacent to the Ruggles Street Station of the MBTA Orange Line. Parcel 18 is roughly rectangular in shape and is bounded on the east by Tremont Street (relative to "Plan North" as indicated on Figure 2), on the west by the access road and walkway to the MBTA Station, on the north by Melnea Cass Boulevard, and on the south by Ruggles Street. Parcel 18B lies west of Parcel 18 and is bounded on the west by Ruggles Street Station, on the east by the access road to the MBTA Station, on the north by Melnea Cass Boulevard, and on the south by the Pedestrian Concourse to the MBTA Station. The Project Locus is shown on Figure 1 and a detailed plan of the site layout is shown on Figure 2.

2-02. SITE HISTORY

2-02.1 Introduction

Site history presented herein is based, in part, on information gathered for the Preliminary Oil and Hazardous Material Site Evaluation, with emphasis on usage which potentially might result in site contamination (2). Further site history research was conducted for the Phase Two evaluation to investigate the location and disposition of underground storage tanks on site, to clarify activities of businesses identified during the preliminary evaluation, and to evaluate site usage on Parcel 18B. Information on potential off-site sources of contamination was also collected.

2-02.2 Site and Area Development

In 1814 the site was an undeveloped tract of land between Roxbury Crossing and the Boston Back Bay shoreline (2). By 1836, Tremont Street (1832) and the Boston and Providence Railroad (1835) had been constructed adjacent to the site (2). In the 1880's, the area north of the site between Tremont Street and Columbus Avenue was developed as a residential area (2).

Commercial development in the site area began in the late 1880s and continued throughout the first quarter of the 20th Century. Following a period of deterioration through the 1950s

and early 1960s, numerous buildings in the site area were razed for the proposed I-95 Highway (2,3). By 1970, only a service station, an apartment building and a Masonic Temple remained on site (2). By 1978, all structures on site had been razed (2,3).

2-02.3 Site Usage and Potential Sources of Contamination

Several former businesses on site were identified as potential sources of contamination based on operations which likely involved the use of oil or hazardous materials. The names and approximate dates of occupancy of these business are included in Table I. The locations of the businesses are shown on Figure 2 and are referenced to descriptions on Table I by letter designations. It should be noted that business loca tions are based on the historic street layout as delineated on Figure 2.

Gas stations existed at six locations on site from the early 1940s to the late 1970s. The Goldberg Elliott Gas Station (A), which later became the Calso Gas Station, occupied the corner of Whittier Street and Columbus Avenue during the period from 1940 to 1955 (4). On the opposite side of Columbus Avenue (B), a service station with multiple ownership operated from about 1930 to 1965 (4,5). Further north on Columbus Avenue, a Chevron service station (G) existed from approximately 1930 to 1970 (4,5). B&C Shell Filling Station (I) and later Sid's Service Station occupied the site near the corner of Columbus Avenue and Western street (5). Two filling stations, Woodies Flying A Service Station (K) and, later, Crosby Gas Station (L), operated at approximately the same location off Tremont Street from about 1930 to 1966 (2,4,5).

A review of historic site plans was used to locate underground fuel storage tanks on site (6). The locations of the tanks identified are designated with the letter "T" on Figure 2. Documentation of whether these tanks were abandoned in place or removed has not been identified. However, demolition plans for the proposed Southwest Corridor Project dated 1979 specified that four storage tanks at the Shell Filling Station (I) were to be excavated and removed from the site. In addition to the underground fuel storage tanks at gas stations, it is likely that underground tanks for storage of heating fuels or waste oils were used at the site (7).

Other site businesses whose operations may have involved oil or hazardous materials include: Tool and Lubrication Equipment Co. (C), Artistic Metal, Inc. (D), Metal Craft Screens (E), Woodward Auto Repair (F), Salem Press (H), Melfore Machine Shop (J), coal yards (M,T), Laundries (N,Q), Raincoat Mfrs. (O),

Babb C.H. Co., Inc. (oven mfrs.) (P), Tremont Fuel Co. (R), and Moores Machine Co., Inc. (S) (2,4,5). Further investigation of the Dodge Chemical Company and Mercury Distributers, identified during the preliminary site evaluation as potential sources of contamination, revealed the former as a storage facility and the latter primarily as a distributer of merchandise (8,9).

2-02.4 Potential Off-Site Sources of Contamination

Four gas stations formerly located adjacent to the site include a Merit Filling Station located south of the site on Columbus Avenue, a filling station at the northeast corner of Whittier and Tremont Streets, Dougies Service Station at the northeast corner of Ruggles and Tremont Streets, and Goodwin Gas Station at the southwest corner of Walpole Street and Columbus Avenue. Other potential off-site sources of contamination include two laundries and a sign painter east of the site on Tremont Street, and a machine shop at the northwest corner of Sarsfield Street and Columbus Avenue. Although undocumented releases of oil or hazardous materials may have occurred in the site vicinity in the past, a review of DEP file data has revealed no oil or hazardous material spills, no recorded incidents or complaints involving oil or hazardous materials, nor any documented waste disposal sites in the site vicinity (10).

2-03. EXISTING SITE CONDITIONS

The site presently consists of vacant land which has been graded, landscaped and is mostly surrounded by fencing. A few small trees have been planted on the site which is otherwise covered predominantly with grass. Parcel 18 is divided by a paved driveway which joins Tremont Street with the access drive to the MBTA station. A temporary barricade prevents traffic from entering the site along this driveway from Tremont Street.

Surrounding site features include the MBTA Ruggles Street Station to the west, vacant land or parking lots to the north and south, and an apartment building on the opposite side of Tremont Street to the east.

III. SUMMARY OF PREVIOUS STUDIES

3-01. GEOTECHNICAL STUDIES

3-01.1 Southwest Expressway and Inner Belt Highway Projects

In the late 1960s, at least thirty test borings were completed at the site as part of a geotechnical investigation for the proposed Southwest Expressway/Interstate 95 and Inner Belt/ Interstate 695 Highway projects. The test borings, shown on Figure 3, are denoted by the following prefixes: A, B*, SB, NB, IR, PB and the 300 series. The explorations ranged in depth from approximately 61 to 203 feet below ground surface, and included two borings that encountered bedrock at depths of approximately 145 feet (IR187) and 189 feet (B81*) below ground surface. No evidence of oil or hazardous materials was noted on the test boring logs which are included in "Summary Geotechnical Data Report, Section Two, Southwest Corridor Project, Roxbury, Massachusetts," by Haley & Aldrich, Inc., dated September 1979.

3-01.2 Southwest Corridor Project

Late in 1979, Haley & Aldrich, Inc., completed five additional test borings at the site as part of a geotechnical investigation for the proposed Southwest Corridor Project. Shown on Figure 3, the borings are denoted by the prefix II.

The test borings ranged in depth from approximately 20 to 167 feet below ground surface. Boring II-27 encountered bedrock at approximately 166 feet below ground surface. The log for Boring II-28 indicated that a void 3.5 to 9.5 feet below ground surface might correspond to a buried fuel oil tank. No indication of fuel odors or petroleum contaminated soils was noted on the boring log, thus if a tank was present, it is unlikely that it contained petroleum product. Logs of the test borings are included in "Geotechnical Interpretive Report, Section Two, Southwest Corridor Project, Roxbury, Massachusetts," by Haley & Aldrich, Inc., dated February 1983.

3-02. ENVIRONMENTAL STUDIES

3-02.1 WCH Industries Site Assessment

In August 1986, WCH Industries of Waltham, Massachusetts completed a "Site Assessment Study of Parcel 18 to Determine Potential of Hazardous Waste" for the Boston Redevelopment Authority (BRA). The investigation reviewed available historical documentation regarding the past usage of Parcel 18 and abutting properties to identify the possible presence of

hazardous materials. The report also evaluated the social and economic impacts that site development might have on the community of Roxbury.

Historical research conducted by WCH Industries indicated that groceries, shoe repair shops, real estate offices, restaurants as well as several gasoline stations and a chemical company were once located at the subject site. Permits were issued from the Boston Fire Department for the on-site storage of flammable liquids such as gasoline and lubricating oil. The study revealed no evidence that tanks installed on-site were removed, and concluded that some underground tanks may still be present. It was also noted that a number of buildings were demolished at the site and that soils should be tested for the presence of asbestos.

3-02.2 Rizzo Associates Site Assessment

Rizzo Associates of Natick, Massachusetts, prepared a "Letter Report Relative to the Massachusetts Oil and Hazardous Materials Release Prevention and Response Act of 1983, Southwest Corridor Parcel 18, Roxbury, Massachusetts," dated 30 January 1987, for the BRA. Subsurface investigations conducted included a geophysical survey and test pit excavation. Soil samples were screened in the field for the presence of volatile organic compounds and selected samples were submitted to a laboratory for chemical analysis.

Test pit locations, shown on Figure 3, were selected based on the historical review conducted by WCH Industries and geophysical measurements by Weston Geophysical. Fill at the site was described as sand, gravel and debris including brick, concrete, wood and metal piping. One underground steel storage tank was identified at test pit TP7 (Figure 3). No evidence of petroleum product, stains or odors was found in the vicinity of the tank, however "strong volatile organic odors" were detected in several of the test pits. A photoionization detector was used to screen soils for volatile organic compounds. Resulting concentrations ranged from zero parts per million (ppm) to 27 ppm.

Individual and composite soil samples were obtained from the test pits and were submitted for analysis of asbestos, volatile organic compounds, pesticides, PCBs, acid and base/neutral extractable compounds and metals. Base/neutral extractable compounds were detected in the site composite sample at a total concentration of 15.14 ppm. Arsenic, barium, lead, mercury and silver were detected at concentrations of 1.6, 97.5, 50.9, 0.025 and 0.52 ppm respectively. The study concluded that

concentrations of the metals were typical of urban fill except for the elevated silver content. No asbestos, volatile organic compounds, pesticides or PCBs were detected in the soils tested.

The report recommended that further subsurface investigations be conducted to locate possible underground storage tanks, and that the Department of Environmental Quality Engineering be notified of the results of the assessment.

3-02.3 Haley & Aldrich Site Evaluation

In September 1988, Haley & Aldrich, Inc., completed a "Report on Preliminary Oil and Hazardous Material Site Evaluation, Parcel 18 Development, Boston, Massachusetts." This evaluation consisted of a review of readily available information on historical use and subsurface conditions supplemented by visual observations and a limited subsurface exploration program.

Historical research conducted by Haley & Aldrich, Inc., indicated that permits were issued for the storage of large quantities of petroleum products at the site and that up to twenty-five or more underground storage tanks might have existed or could still exist beneath the site. In addition to petroleum products, the preliminary evaluation concluded that solvents and metals were likely to have been used or stored on the site over time.

Four test borings with observation wells (P18-1 through P18-4) ranging in depth from 84 to 145.5 feet below ground surface were conducted for preliminary geotechnical design purposes. Petroleum odors were noted in samples from boring P18-2 at depths of 4 to 6 feet and 18 to 22 feet below ground surface. Selected soil samples from the ground surface to depths of 17 to 26 feet were screened in the Haley & Aldrich, Inc., laboratory for the presence of detectable volatile organic compounds with an HNU photoionization detector. HNU readings greater than or equal to 200 ppm were detected in three soil samples from boring P18-2. Readings below 8 ppm were detected in samples from borings P18-1, P18-3 and P18-4. The report recommended that additional studies be conducted to further evaluate the nature and extent of contamination at the site.

IV. SUBSURFACE EXPLORATION

4-01. INTRODUCTION

In accordance with the recommendations in the Preliminary Oil and Hazardous Material Site Evaluation, additional subsurface explorations were conducted to provide an indication of the possible nature and extent of contamination at Parcel 18 and Parcel 18B. As described below, subsurface explorations completed for the Phase Two study included: vadose zone sampling, magnetometer survey, test pits, test borings and groundwater observation well installations.

4-02. VADOSE SAMPLING

A soil vapor survey at Parcel 18 was conducted by Haley & Aldrich, Inc., on 5, 6 and 7 October 1988. The survey included sampling of soil vapors, and on-site analysis of the vapors for the presence of selected volatile organic compounds (VOCs) using a gas chromatograph (GC).

Soil vapor samples were collected at twenty-three stations from one or more depths between 3 and 8 feet below ground surface. The stations are designated SV1 through SV23 on Figure 4. Sampling was typically conducted in the vicinity of suspected underground storage tank locations as indicated by site history research. Specific VOCs analyzed include trichloroethylene, tetrachloroethylene, benzene, toluene, ethylbenzene and xylenes. Instrument calibration was performed using mixed standards containing the six specific analyses. The presence of other detectable compounds, as revealed by chromatograph peaks not corresponding to any standard peak, was noted. Approximate identification of these compounds and their concentrations were noted in some cases.

At each station, a sampling tube was driven to the desired depth using the percussion mode of a rotary-percussion drill. At sampling locations where the soil was especially difficult to penetrate with the sampling tube, a drill bit was used to penetrate the upper 1.5 feet of soil. A portion of the tube was left exposed above ground surface, then vapors were drawn from adjacent soil voids through slots in the bottom of the tube using a vacuum pump. A sample of the soil vapor was collected with a syringe, then injected into the GC for analysis.

The sampling tube and drill bit were generally washed between sampling stations by a laboratory-soap scrub, a tap water

rinse, a methanol rinse and a final tap water rinse. After sample injection, the syringe was purged with hydrocarbon-free air to remove prior sample residue. Sampling tube and syringe blanks were analyzed between samples to verify that sampling equipment was not contaminated.

A Photovac Model 10S50 gas chromatograph was used for the analyses under the following instrument conditions:

Detector	- 10.6 eV Photoionization Detector
Oven Temperature	- 40°C isothermal
Carrier Gas	- Hydrocarbon-free air
Flow Rate	- 15 ml/min
Column	- CPSil 5CB, Capillary

A peak on a sample chromatogram was judged to correspond to a peak on a calibration chromatogram if respective retention times were within one second of each other. Similarities in calibration peak and sample peak shapes were also considered in identifying compounds. Concentrations of the VOCs were calculated by multiplying the peak areas on sample chromatograms by the corresponding response factors.

Results of the soil vapor survey are summarized on Table II. Tetrachloroethylene was identified at depths between 3 and 8 feet at station SV2, and trichloroethylene and toluene were identified at a depth of 3 feet at station SV14. Peaks which could only be tentatively identified were detected at SV13 and SV14. The lack of compounds identified at other sampling stations may be related to the inability of vapors from potential contaminant sources at depth to reach the sampling depth (approximately 3 to 8 feet below ground surface). Vapor movement may be retarded by low permeability soils or obstructions in the fill material.

4-03. MAGNETOMETER SURVEY

A magnetometer survey was conducted at Parcel 18 on 11 October 1988 using an Omni IV Tie Line Magnetometer. The objective of the survey was to identify any metallic objects which might coincide with underground storage tanks. The survey was conducted by making traverses with the magnetometer along a grid with a nodal spacing of 25 feet.

The magnetometer provides total magnetic field and gradiometer measurements which are read from a digital display in gamma units. The gradiometer readings are especially sensitive to near surface metallic objects. These objects enhance the

earth's magnetic field and are identified as anomalously high gradiometer readings. Locations of high magnetic anomalies identified during the survey are shown on Figure 4. The magnetic anomalies identified generally correspond with suspected locations of underground storage tanks.

4-04. TEST PITS

Twenty-three test pits were excavated by Crossroads Construction, Inc., between 28 November and 2 December 1988. The test pits were excavated to depths ranging from 11.0 to 19.0 feet using a Mitsubishi MS 180 Excavator. Logs of test pits prepared by Haley & Aldrich, Inc. are included in Appendix C.

Soil samples were collected from the test pits with a metal trowel. Prior to sampling, the trowel was decontaminated with Alconox soap, methanol and distilled water. Soil samples were placed in glass jars covered with foil prior to field screening with a photoionization detector. When weather conditions did not permit field screening, the samples were chilled, then transported to the Haley & Aldrich, Inc., laboratory for screening. Where contamination was observed, the excavator bucket was steam cleaned prior to the start of the next test pit.

4-05. TEST BORINGS

Twenty-two test borings were drilled during the Phase Two site exploration program. Locations of the test borings are shown on Figure 5. Test borings B1, B2, and B3 and adjacent observation wells were completed by Guild Drilling Co. of East Providence, Rhode Island between 3 and 7 October 1988. Borings B3B-OW through B20-OW were completed by New Hampshire Boring of Derry, New Hampshire between 19 December 1988 and 13 January 1989. All test borings were monitored by an Haley & Aldrich, Inc., geologist.

The test borings were advanced to depths ranging from 23 to 34 feet using 3-3/4 or 4-1/4 inch inside diameter (I.D.) hollow-stem augers. Split-spoon soil samples were collected generally at intervals of 2 feet throughout the depth of each boring with a 1-3/8 inch I.D. split-spoon sampler. Split-spoon samples of the soil collected from each boring were placed in glass jars covered with foil and chilled prior to being transported to the Haley & Aldrich, Inc., laboratory for screening with a photoionization detector. Test boring logs completed by Guild Drilling Co. and New Hampshire Boring are included in Appendix D.

Where contamination in a borehole was observed, the hollow-stem augers, drill rods and other tools were steam cleaned prior to the start of the next hole to avoid cross-contamination between borings. The split-spoon sampler was cleaned with Alconox soap, methanol and distilled water between samples.

4-06. GROUNDWATER OBSERVATION WELLS

Groundwater observation wells consisting of 2 inch I.D. Schedule 40 PVC pipe and 0.01-inch machine slotted PVC well screen were installed upon completion of each test boring except B2 which was a trial hole. Ottawa sand was used to fill the annular space around each well screen, followed by a bentonite seal around the riser pipe. Most wells were grouted from the top of the bentonite seal just above the well screen to the ground surface. A protective metal roadway box was installed at each well location. Details of the well installations are contained in Appendix E.

4-07. SURFACE SOIL SAMPLING

Surface soil samples were obtained continuously from the ground surface to a depth of 4 ft. at randomly-selected sampling points shown on Figure 5B. For each of the eleven sections shown on Figure 5, soils from five sampling points were composited for chemical analysis. Composite samples were obtained by first mixing soils from each depth interval at a given sampling point, then mixing equivalent volumes of soil from each of the five sampling points to produce a sample representative of the section.

The surface soil samples were obtained with a split-spoon sampler. Prior to sampling in each section, the split-spoon sampler was washed with a brush in a clean 5-gallon bucket using a mixture of potable water and alconox, followed by a rinse of potable water, distilled water, methanol and a final rinse of distilled water.

Samples were composited using a stainless-steel mixing bowl and spatula. The composite samples were placed in airtight sterile containers and kept chilled until delivery to the laboratory. Chain-of-custody records were completed to document the transfer of the samples to the contract laboratory.

V. GEOLOGY AND GROUNDWATER CONDITIONS

5-01. REGIONAL GEOLOGY

Roxbury, Massachusetts lies in the Boston Basin, a topographic low associated with the New England Physiographic Province (11). The Boston Basin is made up of rocks of the Boston Bay Group, traditionally divided into two formations: the Cambridge Argillite and the underlying, older, Roxbury Conglomerate. The estimated thickness of the Boston Bay Group is over 17,000 feet.

The topographic low of the Boston Basin was created, in large part, by depression of the land surface associated with the advance of the glacial ice sheet. This advance resulted in removal and redeposition of soft rock and existing sediments to form a thin blanket of glacial till. With melting and retreat of the glacier, numerous meltwater streams deposited outwash sands and gravels on top of the till. In low areas, shallow lakes filled with silts and fine sands.

A world wide rise in sea level accompanied melting of the continental ice sheet, and lead to extensive deposition of silt and clay-sized particles in a glacio-marine environment. This deposit, locally called the "Boston Blue Clay", is found throughout much of the Boston Basin. Meltwater streams deposited granular outwash into these marine sediments sporadically throughout the basin. The slow rise to present day sea level flooded shallow depressions creating embayments and estuaries with deposits of fine sands and silts high in organic content. Subsequent placement of miscellaneous fill by man throughout the basin has created the present topographic conditions.

5-02. SITE GEOLOGY

5-02.1 Topography and Drainage

The site is generally flat lying and moderately graded, with elevations ranging from about El. 13 (NGVD) in the northern and eastern portions of the site to El. 22 in the southwest corner according to a recent topographic survey. Surface water runoff is likely to be captured in catch basins and storm drains along the streets surrounding the site.

5-02.2 Site Subsurface Conditions

Site stratigraphy was evaluated based on observations of surficial site features, test borings and test pit data

gathered during the recent site exploration programs and from previous explorations for the aborted Southwest Expressway/Inner Belt highway and Southwest Corridor projects (11). The predominant stratigraphic units encountered, from oldest to youngest are as follows:

- Bedrock: No borings were advanced to bedrock during the recent Phase Two boring program; however, previous borings in the site vicinity indicate top of the argillite was encountered at El. -162 near the northeast corner of the site and El. -122 near the southwest corner. Much of the argillite recovered was described as moderately to severely weathered, possibly as a result of the adjacent Stony Brook Fault Zone (11).

- Glacial Till: The glacial till encountered in the recent test borings is generally described as a hard or very dense gray heterogeneous mixture of sand and silt with little gravel. Previous borings indicate the till appears to follow the bedrock contours, and that the unit may be absent in some areas. Thicknesses range from 15 to 30 feet where borings penetrated the entire stratum.

- Outwash Sands: Recent explorations indicate thicknesses between 5 and 18 feet of gray fine to medium sand with trace silt and gravel overlying the glacial till. Previous boring information describes this stratum as generally less than 20 feet in thickness.

- Marine Clay: The clay deposit generally consists of a soft to hard gray silty clay with little to trace amounts of fine to medium sands, frequent fine sand partings and sandy clay lenses. Within the upper 10 feet, the stratum generally comprises a hard to stiff crust. Below the crust, the clay consistency gradually softens to medium stiff or soft. The recent and previous explorations indicate that the clay decreases in thickness from north to south.

- Marine Sands: All of the recent Phase Two borings except B8 encountered marine sands overlying the clay deposits. The stratum consists of a typically dense brown fine to coarse sand with varying amounts of silt and fine gravel and silt and clay lenses. The stratum ranged from about 4 to 14 feet in thickness in the most recent borings. Olfactory evidence of petroleum contamination in this stratum was noted in many of the recent Phase Two borings, as indicated in Table III.

- Organic Soils: Previous exploratory borings encountered organic soils primarily in the areas along Tremont Street within 250 feet of Ruggles Street and at the west side of the site along Ruggles Street. The recent Phase Two explorations encountered organic deposits in test pits TP11, TP15 and TP16, and in borings B2-OW and B8-OW. The organic soils observed consisted of soft to medium stiff dark brown to gray organic silt with occasional fine sand partings and fibrous peat. The thickness of the organic soils has been found to range from about 2 and 6 feet. Visual and olfactory evidence of contamination was apparent in TP15 and TP16, leading to discoloration of the organic horizon.

- Fill: A surficial stratum of fill typically 14 to 17 feet thick was encountered in the Phase Two explorations. Relatively distinct differences in fill characteristics at various depths reflect several periods of localized development. Early embankment work for the Boston and Providence Railroad to the west of the site during the 1830s may have filled the adjacent low-lying areas (12). Several channelization and diversion projects of Stony Brook occurred between 1832-1834, along with extensive residential and industrial development of the area during the 1880s (11). The fine to coarse sand with gravel and few cobbles encountered in the recent Phase Two test pits may reflect this period of filling.

  Records indicate that all residential and industrial structures east of the current Southwest Corridor alignment were levelled during the 1960s in preparation for the aborted I-95 Southwest Expressway and Inner Belt Projects, adding rubble fill to basements and low-lying areas (11). Typically this sub-stratum of fill is a heterogeneous mixture of medium to coarse sand with gravel, brick, metal, glass, wood, ceramic, glass, concrete and cobblestones. Underground storage tanks were encountered within this stratum in test pits TP2 and TP16 at depths of about 5 feet and 7 feet below ground surface, respectively. In several test pits building walls or foundations were encountered, likely remnants of buildings demolished in the 1960s.

  Grading and roadwork brought the site to the approximate grade of Columbus Avenue and Tremont Street in the late 1970s. Evidence of former roadways traversing the site (e.g. Grinnell Street, shown on Figure 2) was encountered in test Pits TP4, TP11, TP13, TP14, TP16, TP19 and TP20. The most recent major filling episode appears to be related

to earth movement for the Southwest Corridor Transit project (principally the excavation and distribution of embankment fill from the former railroad bed) and realignment of Columbus Avenue, and Tremont and Ruggles Streets adjacent to the site.

Observed within the fill was visual and olfactory evidence of contamination consisting predominantly of petroleum hydrocarbons. This evidence included oil or solvent-like odors and petroleum sheens and is noted on individual test pit reports and test boring logs, and is summarized in Table III.

The relationship between the stratigraphic units described above is illustrated by the subsurface profile shown on Figure 6.

5-03. GROUNDWATER CONDITIONS

5-03.1 Hydrologic Units

Characterization of site hydrologic units was based on observations of water levels and soil stratigraphy during test pit excavation and drilling of test borings. The units defined at the site include the following:

- Granular Soil Unit: The granular soil unit consists of relatively pervious fill material and underlying natural silty sands. Based on site boring data, the granular soils extend from the ground surface to depths ranging from about 20 to 30 feet below ground surface. The water table was encountered in recent test borings at depths ranging from about 15 feet to 22 feet below ground surface typically near the fill/marine sand interface.

  Hydraulic conductivities for a sand strata with varying silt content generally lie between 10^{-2} and 10^{-5} cm/s (13). Although much of the fill on site is comprised of a sand matrix with varying amounts of silt, voids and debris in the fill are likely to result in highly variable hydraulic conductivities.

- Cohesive Soil Unit: The cohesive soil unit consists of a low permeability silty clay layer which contains sand partings and sandy clay lenses. Site boring data indicates that the cohesive soils extend from their contact with overlying granular soils to depths greater than 100 feet below ground surface. Hydraulic conductivities for unweathered marine clays generally range from about 10^{-7}

to 10^{-10} cm/s (13). Higher hydraulic conductivities would be expected where sand partings or lenses are present.

5-03.2 Groundwater Characteristics

Groundwater flow at the site was evaluated based on water levels observed in site observation wells. Water level depths and corresponding elevations measured in the observation wells are recorded on the groundwater monitoring reports contained in Appendix F.

A groundwater contour map based on 30 January 1989 water level readings of observation wells is shown on Figure 7. Arrows showing the direction of groundwater movement, interpreted from the contours, indicate two primary patterns: a) groundwater flow generally westward toward Ruggles Street Station, and b) radial groundwater flow toward a slight "depression" in the groundwater table in the vicinity of observation well B2-OW.

The relatively high groundwater table at the southeast corner of the site may be influenced in part by leakage of water from a stormwater drain near well B1-OW. Following moderate rains the previous day, the water level at observation well B1-OW on 30 January 1989 was 12.4 feet, 2.1 feet higher that the level measured on 22 December 1988. The average water level fluctuation over the same period for nine other observation wells was less than 0.5 feet.

Groundwater gradients, indicated by the relative spacing of the groundwater contours on Figure 5, are generally less than 0.002 feet/foot over the majority of the site. In the vicinity of Ruggles Street Station and well B1-OW, gradients between about 0.5 and 0.1 feet/foot are indicated. Based on a gradient of 0.002 feet/foot, a hydraulic conductivity range of 10^{-2} to 10^{-5} cm/s for sands with varying amounts of silt and an estimated porosity for fine sand of 0.3 (13), the average rate of groundwater flow per unit soil area ranges from about 0.07 to 67 feet/year.

Indications of oil or hazardous materials during groundwater sampling and measurement of water levels are recorded on the groundwater monitoring reports (Appendix F). Petroleum sheen or odors were observed at seven of twenty-five observation well locations including P18-2-OW, B3-OW, B3B-OW, B5-OW, B6-OW, B16-OW and B18-OW. Petroleum odors and a sheen were also observed during development and sampling of observation well B7-OW on 8 February 1989. Subsequent well gauging on 9 and 16 March 1989, however, indicated between 1 and 1.6 feet of phase-separated petroleum product in B7-OW.

The product in well B7-OW was observed to be amber colored and may be related to a petroleum product identified as kerosene in test pit TP-19, approximately 30 feet to the west. It is possible that gradients induced by well development and sampling and/or the release of particles from well screen openings during development resulted in the influx of product to the well. Studies of actual versus apparent product thickness in aquifers have indicated that product thickness measured in an observation well may range from about 2 to 10 times the actual thickness in the surrounding formation (14). The thickness of product in the sand layer in the vicinity of B7-OW may therefore be only a few inches.

VI. LABORATORY SCREENING AND CHEMICAL TESTING

6-01. LABORATORY SCREENING

Soil samples obtained during the test boring program were placed in screw top glass jars sealed with aluminum foil. Sample jars were then chilled prior to transport to the Haley & Aldrich, Inc., laboratory. In the laboratory, measurements of the relative concentration of volatile organic gases in the headspace above the samples were obtained using an HNU Systems, Inc., PI-101 photoionization analyzer. Using ultraviolet light from an 11.7 eV lamp, this instrument ionizes trace gases such that the positive ions created are attracted to an electrode having an applied negative potential. The current measured at this electrode is proportional to the trace gas concentration. The instrument readout provides a general indication of the presence of detected volatile organic compounds in parts per million (ppm). Some inorganic gases may also be detected.

Results of the headspace measurements are provided on Table III which includes data for borings P18-1 through P18-4 which were completed for the preliminary geotechnical site evaluation. The table also provides remarks on soils with visual or olfactory evidence of contamination. Results of similar screening of samples from test pits are recorded on the test pit reports. The notes on the reports indicate whether screening was performed in the laboratory or in the field.

More than three hundred soil samples were screened from twenty-six test borings at depths ranging from the ground surface to 34 feet. Screening results indicate HNU readings greater than 10 ppm in forty-seven samples, approximately 15% of all samples analyzed. HNU readings greater than 100 ppm were observed in ten samples from borings P18-2, B3-OW, B6-OW and B7-OW. Readings greater than 10 ppm generally indicate soils which may contain significant concentrations of volatile organic compounds. Elevated readings were detected primarily in the fill and underlying natural sands between depths of 3 and 24 feet below ground surface (above and below the water table). In borings B3-OW and B6-OW, however, readings greater than 10 ppm were detected 3 to 4 feet into the clay layer which underlies the natural sand stratum.

6-02. CHEMICAL TESTING

6-02.1 Introduction

A laboratory testing program was undertaken to evaluate soil and groundwater quality at the site. Soil and groundwater samples were generally selected for chemical analyses based on the results of HNU screening and visual or olfactory indication of possible contamination. Samples which were apparently uncontaminated were also selected at random to expand the analytical data base for the site. Chemical analyses for borings/observation wells B1-OW through B3-OW were conducted by Enseco, Inc., a chemical testing laboratory in Cambridge, Massachusetts. Analyses for borings/observation wells B3B-OW through B20-OW were conducted by ESA Laboratories, Inc., located in Bedford, Massachusetts. Test results from the analyses and chain-of-custody forms are contained in Appendices G and H, in Volume II of this report. Summaries of soils and groundwater analyses are provided in Tables IV through VI.

6-02.2 Soils from Test Borings

Selected soil samples from test borings and test pits were tested for Hazardous Substance List (HSL) volatile organic compounds, HSL semivolatile organic compounds (acid and base/neutral extractable), priority pollutant metals, EP Toxicity, petroleum hydrocarbon analysis by the infrared (IR) method, total petroleum hydrocarbons by gas chromatograph and flame ionization detector (GC/FID), petroleum identification, total cyanide and pesticides/PCBs. Laboratory chemical analysis reports for soils are contained in Appendix G (Volume II). Results of the soils analyses are summarized on Table IV (soils from test pits) and Table V (soils from test borings). An asterisk next to the sample designation on the tables indicates that the sample was interpreted to consist of naturally deposited soils (as opposed to fill).

Analyses of the soil samples indicate the following:

- Volatile Organic Compounds: As shown on Figure 8, volatile organic compounds were detected in eighteen of the forty-eight samples obtained from the test pits and test borings. Total volatile organic compound concentrations ranged from 2.3 parts per billion (ppb) (boring B13-OW) to 17,700 ppb (boring B6-OW), with the highest concentrations generally located in the central portion of Parcel 18. The compounds identified include benzene, toluene, ethylbenzene and xylenes (constituents of gasoline), several chlorinated compounds and acetone.

- Semivolatile Organic Compounds: Semivolatile organic compounds (acid and base/neutral extractable) consisting predominantly of polynuclear aromatic hydrocarbons (PAHs) were detected in five of fifteen samples tested. Concentrations of individual PAHs, which are common by-products of coal combustion, are less than 10 ppm and in many cases less than 1 ppm. In addition to PAHs, bis(2-ethylhexyl)phthalate at a concentration of 1.1 ppm and trace levels of dibenzofuran were detected in boring B6-OW (sample S8) and test pit TP-18 (sample S1), respectively.

- Pesticides and PCBs: As shown on Figure 9 and in Tables IV and V, thirteen pesticide compounds were detected in thirty of the samples obtained from the test pits and test borings. Total pesticide concentrations ranged from 12 ppb (boring B11-OW) to 2080 ppb (test pit TP8). Pesticides were detected at depths ranging from 1 to 3 feet at boring B11-OW to 23 to 25 feet at boring B8-OW. PCBs were not detected in soils samples obtained from thirty-three test pit and test boring sampling locations.

- Metals and EP Toxicity: Metals were generally detected in site soils at concentrations typical of New England soils (15). Metals detected at concentrations greater than those typically found in New England soils, but not uncommon in urban soils in the Boston Area, include arsenic (113 ppm) and lead (1460 ppm) in sample B12-S4, lead (494 ppm) in sample TP16-S1 and lead (640 ppm) in sample TP17-S1.

  Eleven soil samples were tested for EP Toxicity which evaluates whether a soil is hazardous waste based on the concentration of eight heavy metals in a leachate derived from the soil. None of the soil samples were determined to be hazardous waste based on EP Toxicity criteria.

- Cyanide: Cyanide was not detected above laboratory reporting limits in twelve soil samples from depths of 9 to 24 feet below ground surface. Laboratory reporting limits ranged from 0.6 ppm to 1.25 ppm.

- Petroleum Hydrocarbons: As shown on Figure 10 and in Tables IV and V, total petroleum hydrocarbon quantification and identification by GC/FID was conducted for 60 soil samples from the test borings and test pits. Petroleum hydrocarbons were identified at depths ranging from about 1 foot to 26 feet below ground surface, and typically consisted of slightly to highly weathered gasoline, kerosene, fuel oil, motor oil and gear oil. Concentrations of petroleum hydrocarbons ranged from 1 ppm in sample B14-S8 to 2,128 ppm in sample TP15-S1.

Selected soil samples from test borings were analyzed for petroleum hydrocarbons by the IR method. The data indicate significant variation between petroleum hydrocarbon concentrations determined by IR as compared to those determined by GC/FID. These discrepancies may be related to interference effects commonly associated with the IR method (16). In addition, it should be noted that quantification of petroleum hydrocarbons by ESA Laboratories, Inc., for the GC/FID method takes into account only those hydrocarbons differentiated by the GC and evident as chromatograph peaks.

6-02.3 Surface Soils

One surface sample composite from each of the eleven sections shown on Figure 5B was tested for HSL semivolatile organic compounds (acid and base/neutral extractable), priority pollutant metals, and pesticides/PCBs. Composite samples from Sections I, V, VII and XI were also tested for total cyanide. Laboratory chemical analysis reports for surface soils are contained in Appendix G (Volume II). Results of the surface soils analyses are summarized in Table V-B.

Analyses of the surface soil samples indicate the following:

- Semivolatile Organic Compounds: Semivolatile organic compounds consisting of several PAHs and three phthalates were detected in all but one of the composite surface samples. The PAHs ranged in concentration from 850 ppb (naphthalene) to 75,000 ppb (anthracene and phenanthrene). The phthalates were detected at a maximum concentration of 7,100 ppb.

- Pesticides and PCBs: One or more of five pesticide compounds were detected in each of the composite surface samples. The most frequently detected pesticide was aldrin which ranged in concentration from 51 ppb in Section V to 288 ppb in Section VII.

  One PCB, AROCLOR-1260, was detected at a concentration of 302 ppb in the composite surface sample from Section I.

  Metals and Cyanide: Metals were detected in surface soils within the range of concentrations generally typical of New England soils (15). Cyanide was not detected above laboratory reporting limits in each of the four composite samples analyzed.

6-02.4 Groundwater

Groundwater was sampled from fifteen of the twenty-one observation wells on site on 7, 8 and 9 February 1989. Before sampling the groundwater, approximately three well volumes of standing water were removed from the well with a stainless steel bailer. After removal of the standing water, a sample was obtained from the well with the bailer and immediately poured into laboratory prepared containers. The bailer was decontaminated prior to sampling at each well location with an Alconox soap wash, then rinsed successively with tap water, methanol and distilled water. The groundwater samples were chilled after their collection until delivery to the laboratory for analysis.

Chemical analyses performed on the groundwater samples included Hazardous Substance List (HSL) volatile organic compounds, HSL semivolatile organic compounds (acid and base/ neutral extractable), priority pollutant metals, petroleum hydrocarbon analysis by the infrared (IR) method, total petroleum hydrocarbons by gas chromatograph and flame ionization detector (GC/FID), petroleum identification, total cyanide and pesticides/PCBs. Laboratory chemical analysis reports for groundwater are contained in Appendix H (Volume II). Results of the groundwater analyses are summarized in Table VI and depicted on Figure 11.

Analyses of groundwater indicate the following:

- Volatile Organic Compounds: Volatile organic compounds were detected in groundwater from five of fifteen observation wells including B3B-OW, B5-OW, B6-OW, B11-OW and B19-OW. Concentrations of total volatile organic compounds ranged from 1,120 ppb in B3B-OW to 3.4 ppb at B19-OW. The compounds identified include toluene, ethylbenzene and xylenes (constituents of gasoline), acetone and chlorobenzene. No compounds were detected above United States Environmental Protection Agency Proposed Maximum Contaminant Levels for toluene (2,000 ppb), ethylbenzene (700 ppb) and total xylenes (10,000 ppb) (17).

- Semivolatile Organic Compounds: No semivolatile organic compounds (acid, base/neutral extractable) were detected in any of the five samples analyzed from observation wells B1-OW, B6-OW, B13-OW, B16-OW and B19-OW.

- Pesticides and PCBs: Pesticides were detected in each of the twelve samples analyzed at total concentrations ranging from 0.49 ppb (B6-OW) to 5 ppb (B7-OW). Eight pesticide compounds were detected including heptachlor, with a proposed maximum contaminant level in drinking water of 0.4 ppb (17). This maximum contaminant level was exceeded only in groundwater sampled from well B2-OW, where 0.5 ppb heptachlor was detected.

- Metals: Nickel was detected at five observation well locations (B1-OW, B6-OW, B13-OW, B16-OW and B19-OW) at concentrations ranging from 0.11 ppm to 0.23 ppm. Zinc was detected at wells B1-OW and B16-OW at concentrations of 0.006 ppm and 0.011 ppm, respectively. Zinc was not detected above the United States Drinking Water Standard of 5.0 ppm (18).

- Cyanide: Cyanide was not detected above laboratory reporting limits in five samples from observation wells B1-OW, B6-OW, B13-OW, B16-OW and B19-OW. For each analysis the laboratory reporting limits was 0.01 ppm.

- Petroleum Hydrocarbons: Total petroleum hydrocarbons in six out of the ten groundwater samples tested were less than <1 ppm (by GC/FID). The maximum level of petroleum hydrocarbons detected was 6 ppm in well B3B-OW where gasoline and motor oil were identified. Petroleum hydrocarbons similar to gasoline were also detected in groundwater from wells B6-OW and B11-OW.

6-02.5 Discussion of Sources and Extent of Contamination

The chemical test data for site soils indicates generally low to moderate levels of petroleum hydrocarbon contamination including gasoline, fuel oil and lubricating oils. Low levels of chlorinated solvents were identified in a few isolated areas including soils in the vicinity of boring B11-OW. Much of the contamination is likely to have resulted from former site usage which has included machine shops, automobile service stations and associated underground storage of fuels. In addition, several episodes of filling at the site may have resulted in petroleum hydrocarbon contamination from an off-site source being present in fill materials. Petroleum hydrocarbons were also detected in site areas where no specific source of contamination has been identified, including test pits TP3 and TP4. Concentrations of petroleum hydrocarbons in these areas are quite low (typically <100 ppm), and may be indicative of background levels for urban fill soils in the site area.

Low levels of pesticides were detected in soils at various depths throughout the site. Pesticides were detected above and below the water table in fill materials and in natural sand and clay strata. The apparently random distribution of pesticides in site soils indicates that they are likely to have originated in the fill materials which were brought on site during several stages of filling. The pesticide concentrations detected may be typical of background levels in the site area which has likely undergone similar development and filling patterns.

Metals and semivolatile organic compounds were detected in site soils at levels generally typical of urban fill. Variation in concentrations of selected compounds is likely the result of heterogeneity of fill materials brought to the site.

Groundwater at the site was found to contain generally low levels of metals, petroleum hydrocarbons and associated volatile organic compounds (toluene, ethylbenzene, xylenes), and in most instances meets drinking water guidelines or standards available for selected compounds. No volatile organic compounds or petroleum hydrocarbons were detected in groundwater sampled at well B7-OW where about 1 to 1.6 feet of phase-separated petroleum product was observed approximately one month after the samples were obtained for chemical testing. This indicates that the product likely became mobilized only when the observation well was developed and has thus had limited impact on surrounding groundwater quality.

Low levels of several pesticide compounds were also detected in the groundwater. Pesticides are generally characterized by low solubilities, however solubilities may increase in the presence of certain petroleum hydrocarbons including gasoline which has been identified in site soils. Downward movement of pesticides in groundwater is likely to have resulted in the redistribution of pesticides from fill materials to underlying natural sand and clay soils. The concentrations of pesticides detected in the groundwater may also be partially attributed to sediment in the groundwater which may have contained residual levels of pesticides.

6-02.6 Quality Assurance/Quality Control (QA/QC)

A QA/QC program was undertaken to evaluate analytical consistency of the chemical testing laboratory and field decontamination procedures. Consistency of laboratory analyses were evaluated by conducting similar analyses on "duplicate" soil and groundwater samples. The results of the duplicate soil analysis are provided in Appendix G where sample TP101-S1 is a duplicate of TP1-S1, and Sample TP701-S1 is a duplicate of

TP7-S1. The test results for the groundwater duplicate are provided in Appendix H, where sample B202-OW is a duplicate of B6-OW. Field decontamination procedures were evaluated by rinsing a "decontaminated" split spoon sampler or stainless steel bailer with laboratory-prepared deionized water. Analytical results for the "rinse blank" obtained during the test boring program (Sample No. B9-S8"R") are provided in Appendix G. Analytical results for the rinse blank obtained during groundwater sampling (Sample No. B201-OW) are provided in Appendix H.

The QA/QC program indicated the following:

- The duplicate soil samples were analyzed for volatile organic compounds, semivolatile organic compounds, metals, pesticides, cyanide and total petroleum hydrocarbons. The analyses indicated generally good agreement between concentrations detected in the duplicate samples. The highest degree of variation was observed for concentrations of pesticides and petroleum hydrocarbons. Such variation is not unexpected given likely heterogeneities in the soil samples.

- The groundwater duplicate was analyzed for volatile organic compounds, semivolatile organic compounds, metals, pesticides and total petroleum hydrocarbons. The results indicate good agreement between concentrations of compounds detected with the exception of metals and pesticides. Nickel was detected in sample B6-OW, whereas nickel, arsenic and mercury were detected in the duplicate B202-OW. Likewise, beta-BHC was detected in sample B6-OW, whereas alpha-BHC, beta-BHC, gamma-BHC and endosulfan sulfate were detected in B202-OW. It is possible that because these compounds were detected at levels relatively close to their detection limits, they may not be detected in some instances due to slight variations in sensitivity of the analytical instrument.

- The rinse blank obtained from the split-spoon sampler during the test boring program was analyzed for volatile organic compounds, semivolatile organic compounds, metals, cyanide, pesticides and total petroleum hydrocarbons. The analyses identified low concentrations of chloroform (8.7 ppb), nickel (0.003 ppb), alpha-BHC (0.367 ppb) and petroleum hydrocarbons (1 ppm), indicating only limited residual contamination on the sampler.

- The rinse blank obtained from the stainless steel bailer was analyzed for volatile organic compounds and total petroleum hydrocarbons. Chloroform (13.7 ppb) and less than 1 ppm petroleum hydrocarbons were detected. Chloroform was not detected in groundwater samples from other locations on site and may have been present in the laboratory-prepared water used to rinse the sampler.

VII. RISK ASSESSMENT

An assessment to characterize risk of harm to human health, safety, public welfare and the environment from contamination identified at the site was performed by Meta Systems, Inc. (Volume III). The risk assessment was based primarily upon data obtained during the Phase Two environmental site assessment presented herein.

The risk assessment evaluated several exposure scenarios based on stages of proposed site development and related target receptors (those potentially exposed to contaminated materials). The development stages include the site in its present condition, construction under Phase I site development (Tower II and parking garage), construction under Phase II and Phase III site development (Towers I, III, and IV), and post construction/development site conditions. Target receptors identified for the assessment include: occasional trespassers (under current site conditions); construction workers, pedestrians passing by the site (primarily commuters) and resident children playing in the site vicinity (during construction); and office workers, maintenance personnel, emergency workers and children playing in a proposed on-site playground (after construction).

Potential exposure routes from contaminated materials to target receptors include the following:

- Inhalation of respirable particles during construction by workers on site, pedestrians and children playing in the site vicinity.

- Dermal absorption through direct contact with surface and subsurface soils by construction workers or children playing on site after construction (an on-site playground is proposed for a later phase of site development).

- Ingestion through direct contact with surface and subsurface soils by construction workers or children playing on site.

The exposure assessment assumed that each phase of the proposed site development will consist of an at-grade construction scheme. With the at-grade scheme, only a small amount of soils excavation associated with pile caps, grading, utility trenches, etc., would be required.

The risk assessment considered exposure risk to target receptors including acute risk, non-carcinogenic chronic risk, and carcinogenic risk. The findings of the risk assessment, as presented in Volume III, include the following:

1. There is no risk of harm to human health or the environment from contaminated groundwater on site. The site is located in an urbanized area with no potentially impacted surface water body or other environmental receptors in the area. Drinking water is supplied to the site area from the MDC system and large-scale dewatering is not required for planned construction activities.

2. Calculated carcinogenic and non-carcinogenic risk to the most exposed population (construction workers and daycare children) due to exposure to contaminated soils does not exceed DEP benchmarks. Non-carcinogenic risks to construction workers approach the DEP benchmark of 0.2 under scenarios which assume no dust control due to metals contamination in soils. Institution of dust control measures during construction would mitigate the effects of metals contamination in soils.

3. Soil gas data indicate that the intrusion of vapors into above grade facilities is extremely unlikely.

4. The risk to trespassers under current site conditions and office workers, emergency repair crews, and maintenance workers under future site conditions will be less than that to construction workers.

5. Risk to children using the play area proposed for a future phase of site development are not in excess of DEP benchmarks. However, removal and replacement of soils in this area or capping of the soils with concrete or a similar barrier was recommended.

XIII. PRELIMINARY EVALUATION OF SOIL TREATMENT/ DISPOSAL OPTIONS

8-01. INTRODUCTION

Under the Massachusetts Contingency Plan (MCP), the feasibility of site remediation alternatives, including soil treatment or disposal, is evaluated as part of Phase Three remedial response actions. To assist in site development planning, a preliminary evaluation of soil treatment/disposal options is provided as part of the Phase Two study presented herein. This preliminary evaluation does not preclude the completion of the feasibility study under Phase Three, as required by the MCP.

The Phase Two site evaluation has identified generally low levels of contamination in site soils and groundwater relating primarily to petroleum hydrocarbons used on site or contamination within fill materials brought on site. The risk assessment for the site indicates that in its present condition the site poses no significant risk to human health or the environment. As a result, remediation of the site in its present condition would not be required from a human health or environmental risk-based standpoint. Treatment or disposal of site soils does become an issue if soils containing oil or hazardous materials are excavated and must be disposed off site.

Given time constraints imposed by proposed site development and limited area on site for stockpiling of soils, soil treatment/ disposal options were selected which involve off-site disposal or recycling of contaminated soils. An option is also provided which calls for an at-grade development scheme to limit soils excavation and reduce the quantity of soils which may require special handling. A summary of proposed soil treatment/ disposal options and estimated costs for implementation of each option are provided on Table VII. The costs are only for treatment/disposal of soils excavated within the proposed garage footprint (Figure 12). Table VIII contains a listing of the advantages and disadvantages of each option. Details of each treatment/disposal option are presented below.

8-02. AT-GRADE SCHEME

The at-grade scheme requires that site development be conducted with minimal excavation, and therefore would rule out construction for below-grade parking. This scheme assumes that all soils which may be excavated for pile caps, utility

trenches or other construction related features would be disposed on site. Because contaminated soils remain capped on site, costs for treatment and disposal are small.

8-03. BELOW-GRADE SCHEME

8-03.1 Pre-Approved Disposal Site

One of the proposed site development options includes three levels of below-grade parking which would require excavation of large volumes of potentially contaminated soils. In order to facilitate disposal, excavated soils would be transported to a pre-approved disposal site. This site would require DEP approval subsequent to extensive evaluation to determine disposal site suitability. Disposal at such a site would result in long-term liability for potential future impacts from contaminated soils.

8-03.2 Soil Segregation

Soil segregation would be implemented as a remediation technique to reduce the volume of excavated soils which require special handling. More highly contaminated soils are separated from those with contamination typical of site background levels and either disposed in a special landfill or recycled by asphalt batching. Fixation of contaminated soils in asphalt (asphalt batching) employs on-site batching equipment which generates a product typically used as sub-base material for asphalt pavements.

As shown on Figure 12 for the purpose of discussion of this option, site soils have been classified into three major soil types: urban fill, oil contaminated soil and waste oil contaminated soil. Urban fill is characterized by low concentrations of volatile organic compounds and petroleum hydrocarbons typical of site background levels (generally expected to be <100 ppm). Oil contaminated soils are characterized primarily by volatile organic constituents contained in gasoline and fuel oils (benzene, toluene, ethylbenzene and xylenes), and petroleum hydrocarbons above background levels. Waste oil contaminated soils are distinguished from oil contaminated soils by the presence of volatile organic compounds other than benzene, toluene, ethylbenzene and xylenes (e.g. chlorinated solvents). Each of the soil groups may also contain low concentrations of metals and pesticides which appear to be randomly distributed throughout much of the site soils.

With DEP approval, oil contaminated soils would be disposed in a special Massachusetts landfill or asphalt batched. Because Massachusetts landfills cannot accept soils containing waste oil, waste oil contaminated soils would be disposed (at a higher cost) in a special out-of-state landfill. Subject to DEP approval, urban fill would not require disposal in a special landfill or asphalt batching. However, at present there are no agreed upon criteria to characterize urban fill, and segregation of urban fill from other contaminated soils without testing would be difficult.

As noted on Table VIII, there are several disadvantages associated with soil segregation besides difficulty in classifying soils. Stockpiling of contaminated soils will be required for any of the landfill disposal or asphalt batching options. Segregation of soils prior to stockpiling would require continual evaluation of excavated soil characteristics on a bucket-by-bucket basis. Prior to disposal of oil-contaminated soils in a Massachusetts special landfill, testing for total petroleum hydrocarbons is required for each 20 cubic yards of soils. This testing requirement could result in a lag time of up to one month between soil excavation and transportation. It is also uncertain what impact pesticides in soils will have on obtaining DEP approval for a given disposal option. Identification of soils containing pesticides is not possible without laboratory testing.

8-03.3 Treatment/Disposal of All Non-Clay Soils

In order to reduce the impacts on site development imposed by soil segregation, a "bulk" soil treatment/disposal approach could be considered. This approach assumes that all non-clay soils, which comprise a layer of fill and natural sands approximately 27 feet thick, will be asphalt batched or disposed in special Massachusetts or out-of-state landfills. Although this approach would minimize requirements for bucket-by-bucket evaluation and stockpiling, the costs associated with treatment/disposal of such large quantities of soils are likely to be prohibitive.

IX. SUMMARY AND CONCLUSIONS

A Phase Two Oil and Hazardous Material Site Evaluation has been conducted at Parcel 18 and Parcel 18B located in the Roxbury section of Boston, Massachusetts. The purpose of the Phase Two study has been to evaluate the source(s), nature and extent of oil or hazardous materials at the site, identify possible exposures to human or environmental receptors, characterize the risk of harm to human health and the environment, and provide a preliminary evaluation of soil treatment/disposal options. The study was conducted based on the Phase Two Work Plan, and follows the guidelines of the Massachusetts Contingency Plan. A Waiver Application for the site was approved by the Massachusetts Department of Environmental Protection (DEP) on 31 January 1989.

In 1814 the site was an undeveloped tract of land between Roxbury Crossing and the Boston Back Bay shoreline. Commercial development in the site area began in the late 1880s and continued throughout the first quarter of the 20th Century. Several businesses on site were identified as potential sources of contamination including laundries, a machine shop and other light manufacturing operations. Gas stations were identified at six locations on site. Documentation on whether underground fuel storage tanks were abandoned in place or removed has not been identified. By the late 1970s, all structures on site were razed for proposed highway development.

In order to evaluate site geologic conditions and the nature and extent of soil and groundwater contamination, a subsurface exploration program was undertaken. This program consisted of soil vadose sampling to identify volatile organic contamination, a magnetometer survey to assist in locating underground storage tanks, and completion of test pits, test borings and observation wells to permit evaluation of subsurface conditions and sampling of soils and groundwater for chemical testing.

Conclusions based on work completed at the site to date include the following:

1. Fill materials and natural sands are underlain by a thick clay stratum which is expected to greatly inhibit the downward movement of groundwater. Groundwater flows generally westward toward Ruggles Street Station and radially toward a slight depression in the groundwater table near the southeast corner of the site.

2. Three underground storage tanks have been identified on site based on observations made during test pit excavations. Two tanks were discovered at depths between about 5 and 7 feet below ground surface at test pits TP2 and TP16 completed by Haley & Aldrich, Inc. The third tank was discovered by Rizzo Associates, Inc., at test pit TP7 (Figure 3). A fourth tank was suspected to be present during drilling of previous boring II-28 which encountered a void between depths of 3.5 and 9.5 feet below ground surface (Figure 3). The boring was completed by Haley & Aldrich Inc., for the Southwest Corridor project.

3. Site soils have been contaminated primarily by petroleum hydrocarbons including gasoline, kerosene, fuel oil and lubricating oils. The contamination is likely to have resulted from former site filling and site usage which has included light manufacturing, machine shops, automobile service stations and associated underground storage of fuels. Relatively low levels of petroleum hydrocarbons were also identified in site soils where no specific source of contamination has been identified. Such soils may be characteristic of urban fill in the site area.

4. Low levels of pesticides appeared to be randomly distributed throughout much of the soils on site, including samples from fill material and underlying natural sand and clay strata. No on-site source of pesticides has been identified thus they are likely to have originated in the fill materials which were brought in to fill the site. The pesticide concentrations detected may be typical of residual levels in soils at other sites in this area which have been filled and developed in the same manner as Parcels 18 and 18B. However, data on pesticides in soils is not available for adjacent sites.

5. Metals and semivolatile organic compounds composed primarily of PAHs were detected in site soils at levels typically found in urban fill. One PCB compound was detected in a surface soil composite sample and was likely a component of the fill which was brought on site.

6. Groundwater at the site was found to contain generally low levels of petroleum hydrocarbons, associated volatile organic compounds and pesticides. In most instances the groundwater meets drinking water guidelines or standards available for selected compounds.

7. About 1 to 1.6 feet of phase-separated petroleum product was observed in observation well B7-OW on Parcel 18B, which corresponds to the location of the former Tremont Fuel Company. This product may be related to kerosene which was identified in soils in a nearby test pit and the tank which was suspected to be present in this area. Petroleum hydrocarbons were not identified in groundwater sampled from well B7-OW about one month prior to the discovery of product in the well. This indicates that the product may have appeared in the well only as the result of disturbance from well development and sampling.

8. A preliminary evaluation of treatment and disposal options for excavated soils indicates that special handling of contaminated materials would be costly and would likely impose substantial delays during construction. There is also uncertainty as to whether any given treatment/disposal plan would be approved by environmental agencies of the Commonwealth. It is apparent that time and cost impacts due to special handling of contaminated soils are minimized by development which limits excavation of soils. Such development would entail at-grade construction and on-site disposal of any soils which may be excavated.

9. The risk assessment conducted by Meta Systems, Inc. concluded that risks to human health or the environment associated with the site in its present condition, during construction or after construction do not exceed DEP benchmarks for acceptable risk.

X. RECOMMENDATIONS

Based upon the findings of the Phase Two Oil and Hazardous Material Site Evaluation, we present the following recommendations:

1. As required by law, the three inactive underground storage tanks identified on site must be removed. It is recommended that removal of the tanks be monitored by an environmental consultant to document indications that the tanks were leaking, and what impact such leakage may have had on surrounding soil and groundwater quality.

2. Further subsurface exploration should be conducted in the vicinity of observation well B7-OW where phase-separated petroleum product was observed on the groundwater table. The information would be utilized to assess the extent of the product release, investigate the possible presence of a fourth underground storage tank, and to evaluate clean-up alternatives.

3. Excavation activities at the site should be monitored to identify heavily contaminated soils which may require special handling. Approval from the Massachusetts Department of Environmental Protection (DEP) would be required for off-site disposal or recycling of contaminated soils.

4. Since low concentrations of a variety of contaminants have been detected throughout the site and since off-site disposal would require extensive testing and could be costly, it is recommended that all excavated soils with low levels of contamination be reused on site.

5. Groundwater extracted through construction dewatering or any other site activity may contain petroleum products or other substances which may not be discharged into the local sewers without regulatory approval. Alternatives to discharge into a sewer include recharge on site or off-site disposal. It is recommended that all of these alternatives be considered.

6. Based on the findings of the risk assessment, it is recommended that dust control measures be implemented during construction to reduce levels of risk associated with metals contamination in soil which otherwise approach DEP benchmarks for acceptable health risks. It is also recommended that risks to children in the proposed play

area on site be minimized by removal of contaminated soils or construction of a physical ground barrier, such as a cement cap, over contaminated soils.

7. A feasibility study of remedial action alternatives must be conducted prior to development of a final remedial response plan. The Massachusetts DEP requires this work to be conducted under Phase Three of the Massachusetts Contingency Plan.

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Tables

TABLE I
SUMMARY OF FORMER SITE USAGE
WITH POTENTIAL FOR CONTAMINATION

Parcel 18 and Parcel 18B
Boston, Massachusetts

Key	Previous Usage	Approximate dates of Operation	Possible Types of Contaminants
A.	Filling Station: Calso Gas Station and others	1940-1955	petroleum products, solvents, metals
B.	Filling Station: Columbus Avenue Service Station and others	1930-1965	petroleum products, solvents, metals
C.	Tool and Lubrication Equipment Co. Selby Auto Supply Co.	1935-1955 1955-1965	petroleum products, solvents
D.	Artistic Metal, Inc. Plumber	1955-1965 1940-1945	petroleum products, metals
E.	Metal Craft Screens	1935-1955	petroleum products, solvents, metals
F.	Woodward Auto Repair	1939-1955	petroleum products, solvents, metals
G.	Chevron Filling Station	1930-1970	petroleum products, solvents, metals
H.	Salem Press	1960	dichromaters, nitric acid, petroleum products, lead, cyanide, mecuric chloride, etc.
I.	B&C Shell Filling Station Sid's Service Station	1957-1978	petroleum products, solvents, metals
J.	Allen Eng. Co. Melfore Machine Shop Dean Transportation Co., Inc. - Trucking Weston Parlor Frame Co. - Woodwork	1955 1945 1960 1965	petroleum products, solvents, metals
K.	Woodies Flying A Service Station	1950-1966	petroleum products, solvents, metals
L.	Filling Station: Crosby Gas Station and others	1930-1950	petroleum products, solvents, metals
M.	Coal Yard	1900	coal residues

- Continued -

TABLE I
(Continued)
SUMMARY OF FORMER SITE USAGE
WITH POTENTIAL FOR CONTAMINATION

Parcel 18 and Parcel '3B
Boston, Massachusetts

Key No.	Previous Usage	Approximate dates of Operation	Possible Types of Contaminants
N.	Wash & Dry Day & Night Laund-O-Mat	1960-1965	solvents
O.	Raincoat Mfrs., Wales Manuf., Inc.	1950	petroleum products, solvents
P.	Babb CH Co., Inc. (oven mfrs.)	1960	petroleum products, solvents, metals
Q.	Laundry	1965	solvents
R.	Tremont Fuel Co. A.S. Sls. Co. Junk Dlrs.	1950-1960 1960	petroleum products, metals
S.	Moores Mach. Co., Inc. Auto Repairs	1960	petroleum products, solvents, metals

Note: Approximate dates of operation based upon listings in City of Boston Directories and information on file at the City of Boston Fire Prevention Bureau.

1777h

TABLE II

RESULTS OF SOIL VAPOR SAMPLING SURVEY

Parcel 18 and Parcel 18B
Boston, Massachusetts

CONTAMINANT CONCENTRATION (parts per billion)[a]

Station	Depth (ft.)	Benzene	TCE	Toluene	PCE	Ethyl Benzene	Xylenes	Comments
SV1	3	--	--	--	--	--	--	
	5.5	--	--	--	--	--	--	
SV2	3	--	--	--	3.0	--	--	
	5.5	--	--	--	2.6	--	--	
	8	--	--	--	2.6	--	--	
SV3	3	--	--	--	--	--	--	
SV4	3	--	--	--	--	--	--	
	5	--	--	--	--	--	--	
SV5	4	--	--	--	--	--	--	
SV6	3	--	--	--	--	--	--	
	5.5	--	--	--	--	--	--	
SV7	3	--	--	--	--	--	--	
SV8	3	--	--	--	--	--	--	
SV9	3	--	--	--	--	--	--	
SV10	3	--	--	--	--	--	--	
	5.5	--	--	--	--	--	--	
	8	--	--	--	--	--	--	
SV11	3	--	--	--	--	--	--	
	8	--	--	--	--	--	--	
SV12	3	--	--	--	--	--	--	
SV13	3	--	--	--	--	--	--	Two unidentified peaks [b]
	5.5	--	--	--	--	--	--	Two unidentified peaks [c]
	8	--	--	--	--	--	--	Two unidentified peaks [d]
SV14	3	--	12	11	--	--	--	Several unidentified peaks[e]
SV15	3	--	--	--	--	--	--	
SV16	3	--	--	--	--	--	--	
SV17	3	--	--	--	--	--	--	

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TABLE II
(Continued)

RESULTS OF SOIL VAPOR SAMPLING SURVEY

Parcel 18 and Parcel 18B
Boston, Massachusetts

CONTAMINANT CONCENTRATION (parts per billion)[a]

Station	Depth (ft.)	Benzene	TCE	Toluene	PCE	Ethyl Benzene	Xylenes	Comments
SV18	3	--	--	--	--	--	--	
SV19	2	--	--	--	--	--	--	
SV20	2	--	--	--	--	--	--	
SV21	5.5	--	--	--	--	--	--	
SV22	3	--	--	--	--	--	--	
SV23	3	--	--	--	--	--	--	
B3S6[f]	16-18	--	6,200	6,800	150	2,200	6,200	

NOTES:

a) No entry (--) indicates that the compound was not detected. Detection limits for the compounds were as follows:

Compound	(parts-per-billion)
Benzene	2
TCE (trichloroethylene)	1
Toluene	2
PCE (tetrachloroethylene)	1
Ethyl Benzene	20
Xylenes	5

b) One peak possibly represents 1,1,1-trichloroethane (TCA) in the range of 200 to 250 parts per billion.

c) One peak possibly represents TCA at a concentration of about 200 parts per billion.

d) One peak possibly represents TCA in the range of 150 to 200 parts per billion.

e) One peak possibly represents TCA at a concentration of about 50 parts per billion.

f) Soil sample from testing boring. Detection limit for benzene was 40 parts per billion.

2213h

TABLE III
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
P18-1	S1	0.0- 2.0	FILL	1.0	0.6	
	S2	2.0- 4.0	FILL	0.6	0.6	
	S3	5.0- 7.0	FILL	0.6	0.6	
	S4	7.0- 9.0	FILL	0.6	0.6	
	S5	9.0-11.0	FILL	0.6	0.6	
	S6	11.0-13.0	FILL	1.6	0.6	
	S7	13.0-14.5	FILL	0.6	0.6	
	S8	15.0-17.0	FILL	0.6	0.6	
P18-2	S1	0.0- 2.0	FILL	0.6	0.6	
	S3	4.0- 6.0	FILL	0.6	0.6	Petroleum Odor
	S5	8.0-10.0	FILL	0.6	0.6	
	S7	12.0-13.5	FILL	36.0	0.6	
	S7A	13.5-14.0	FILL	200	0.6	
	S8	14.0-16.0	SAND	300	0.6	
	S9	16.0-18.0	SAND	240	0.6	
	S10	18.0-20.0	SAND	5.0	0.6	
	S11	20.0-22.0	SAND	1.0	0.6	Petroleum Odor
	S12	22.0-24.0	SAND	1.6	0.6	
	S13	24.0-25.0	SAND	0.6	0.6	
	S13A	25.0-26.0	SAND	0.6	0.6	
P18-3	S1	0.0- 2.0	FILL	1.0	0.6	
	S2	2.0- 4.0	FILL	5.8	0.6	
	S3	4.0- 6.0	FILL	2.0	0.6	
	S4	6.0- 8.0	FILL	1.6	0.6	
	S5	8.0-10.0	SAND	1.0	0.6	
	S6	14.5-16.5	SAND	7.2	0.6	
	S7	16.5-18.5	SAND	2.6	0.6	

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TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
P18-4	S1	0.0- 2.0	FILL	0.8	0.6	
	S3	4.0- 6.0	FILL	0.6	0.6	
	S4	6.0- 8.0	FILL	0.7	0.6	
	S6	10.0-12.0	FILL	0.6	0.6	
	S7	12.0-14.0	SAND	1.2	0.6	
	S8	14.0-16.0	SAND	1.0	0.6	
	S9	16.0-18.0	SAND	0.6	0.6	
B1	S1	0.0-2.0	FILL	0.6	0.6	
	S2	5.0-7.0	FILL	0.6	0.6	
	S3	10.0-12.0	FILL	0.6	0.6	
	S4	12.0-14.0	FILL/SILT	0.6	0.6	
	S5	14.0-16.0	SILT	0.6	0.6	
	S6	16.0-18.0	SAND	0.6	0.6	
	S7	18.0-20.0	GRAVEL	0.6	0.6	
	S8	20.0-22.0	SAND	0.6	0.6	
	S9	22.0-24.0	SILT	0.6	0.6	
	S10	24.0-26.0	SAND	1.0	0.6	
	S11	26.0-28.0	SAND/CLAY	0.6	0.6	
	S12	28.0-30.0	CLAY	0.6	0.6	
B2	S1	0.0-2.0	FILL	0.6	0.6	
	S2	5.0-6.1	FILL	0.6	0.6	
	S3	10.0-11.1	FILL	0.6	0.6	
B2B	S3A	10.0-12.0	ORG. SILT	0.6	0.6	
	S4	12.0-14.0	ORG. SILT	0.6	0.6	
	S5	14.0-16.0	ORG. SILT	0.6	0.6	
	S6	16.0-18.0	PEAT	0.6	0.6	
	S7	18.0-20.0	ORG. SILT	0.6	0.6	
	S8	20.0-22.0	GRAVEL	0.6	0.6	
	S9	22.0-24.0	SAND	0.8	0.6	
	S10	24.0-26.0	SAND	0.6	0.6	
	S11	26.0-28.0	SAND	1.2	0.6	
	S12	28.0-29.5	SAND	1.6	0.6	
	S13	30.0-32.0	SAND	1.2	0.6	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B3	S1	0.0-2.0	FILL	0.8	0.6	
	S2	5.0-7.0	FILL	1.8	0.6	
	S3	10.0-12.0	FILL	3.2	0.6	Fumes
	S4	12.0-14.0	FILL	24	0.6	
	S5	14.0-16.0	FILL	70	0.6	
	S6	16.0-18.0	SAND	110	1.6	
	S7	18.0-20.0	SAND	130	1.6	
	S8	20.0-22.0	SAND	18.0	1.8	
	S9	22.0-24.0	SAND/CLAY	12.0	1.6	
	S10	24.0-26.0	CLAY	15.0	1.6	
B3B	S1	1.0-3.0	FILL	4.2	0.6	
	S2	3.0-5.0	FILL	11.2	0.6	
	S3	5.0-7.0	FILL	18.2	0.6	
	S4	7.0-9.0	FILL	2.6	0.6	
	S5	9.0-11.0	FILL	5.4	0.6	Petroleum Odor
	S6	11.0-13.0	FILL	7.0	0.6	Petroleum Odor
	S7	13.0-15.0	FILL	6.2	0.6	Petroleum Odor
	S8	15.0-17.0	FILL	44	0.6	Petroleum Odor
	S9	17.0-19.0	SAND	NA	-	Petroleum Odor
	S10	20.0-22.0	SAND	24	0.6	
	S11	22.0-24.0	SAND/CLAY	3.4	0.6	
	S12	24.0-26.0	CLAY	5.2	0.6	
	S13	26.0-28.0	CLAY	3.4	0.6	
B4	S1	1.0-3.0	FILL	1.2	0.8	
	S2	3.0-5.0	FILL	12.0	0.8	
	S3	5.0-7.0	FILL	7.2	0.8	
	S4	7.0-8.2	FILL	12.2	0.8	
	S5	9.0-11.0	FILL	8.0	0.8	
	S6	11.0-12.5	FILL	17.0	0.8	
	S7	13.0-15.0	FILL	13.0	0.8	
	S8	15.0-17.0	FILL	11.0	0.8	
	S9	17.0-19.0	SAND	3.0	0.8	
	S10	19.0-21.0	SAND	2.4	0.8	
	S11	21.0-23.0	SAND	1.8	0.8	
	S12	23.0-25.0	SAND	1.4	0.8	
	S13	25.0-27.0	SAND	1.4	0.8	
	S14	30.0-32.0	CLAY	1.2	0.8	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B5	S1	1.0-3.0	FILL	6.6	1.1	
	S2	3.0-5.0	FILL	11.2	1.1	
	S3	5.0-7.0	FILL	6.4	1.1	
	S4	7.0-9.0	FILL	3.6	1.1	
	S5	9.0-11.0	FILL	4.0	1.1	
	S6	11.0-13.0	FILL	15.8	1.1	Petroleum Odor
	S7	13.0-15.0	FILL	22	1.1	Petroleum Odor
	S8	15.0-17.0	SAND	8.0	1.0	Petroleum Odor
	S9	17.0-19.0	SAND	19.2	1.0	Soil Discolored
	S10	19.0-21.0	CLAY	9.0	1.0	
	S11	21.0-23.0	CLAY	4.6	1.0	
B6	S1	1.0-3.0	FILL	1.8	1.0	
	S2	3.0-5.0	FILL	2.2	1.0	
	S3	5.0-7.0	FILL	0.8	0.8	
	S4	7.0-9.0	FILL	5.0	0.8	
	S5	9.0-11.0	FILL	20	0.8	
	S6	11.0-13.0	FILL	13.8	0.8	
	S7	13.0-15.0	FILL	58	0.8	Petroleum Odor
	S8	15.0-17.0	FILL	184	0.8	Petroleum Odor
	S9	17.0-19.0	FILL/SAND	176	1.2	Petroleum Odor
	S10	19.0-21.0	SAND	160	1.2	Petroleum Odor
	S11	21.0-23.0	SAND	6.2	1.2	
	S12	25.0-27.0	CLAY	22	1.2	
	S13	27.0-29.0	CLAY	52	1.2	
B7	S1	1.0-3.0	FILL	1.4	1.2	
	S2	3.0-5.0	FILL	3.2	1.2	
	S3	5.0-7.0	FILL	NA	-	
	S4	7.0-9.0	FILL	6.4	1.2	
	S5	9.0-11.0	FILL	0.4	0.4	
	S6	11.0-13.0	FILL	1.6	0.4	
	S7	13.0-15.0	FILL	74	0.4	Petroleum Odor
	S8	15.0-17.0	FILL/SAND	138	0.8	Petroleum Odor
	S9	17.0-19.0	SAND	92	0.8	Petroleum Odor
	S10	20.0-22.0	SAND	120	0.8	Petroleum Odor
	S11	22.0-24.0	SAND	18.2	0.8	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B7	S12	24.0-26.0	SAND	4.2	0.8	
(cont.)	S13	26.0-28.0	SAND/CLAY	2.4	0.8	
	S14	28.0-30.0	CLAY	2.2	0.8	
	S15	30.0-32.0	CLAY	3.4	0.8	
B8	S1	1.0-3.0	FILL	2.0	0.8	
	S2	3.0-5.0	FILL	1.6	0.8	
	S3	5.0-7.0	FILL	2.0	0.8	
	S4	7.0-9.0	FILL	1.8	0.8	
	S5	9.0-11.0	FILL	1.2	0.8	
	S6	11.0-13.0	FILL	1.4	0.8	
	S7	13.0-15.0	FILL	1.4	0.8	
	S8	15.0-17.0	FILL	1.0	0.8	
	S9	19.0-21.0	FILL	1.0	0.8	
	S10	21.0-23.0	FILL	4.0	0.8	
	S11	23.0-25.0	ORG. SILT	0.8	0.8	
	S12	25.0-27.0	ORG. SILT	1.0	0.8	
	S13	27.0-29.0	ORG. SILT	1.2	0.8	
	S14	29.0-31.0	CLAY	1.2	0.8	
	S15	31.0-33.0	CLAY	1.4	0.8	
B9	S1	1.0-3.0	FILL	1.0	0.4	
	S2	3.0-5.0	FILL	4.2	0.4	
	S3	5.0-7.0	FILL	2.0	0.4	
	S4	7.0-9.0	FILL	1.8	0.4	
	S5	9.0-11.0	FILL	3.4	0.4	
	S6	11.0-13.0	FILL	1.8	0.4	
	S7	13.0-15.0	FILL	1.0	0.4	
	S8	15.0-17.0	SAND	0.8	0.4	
	S9	17.0-19.0	SAND	0.8	0.4	
	S10	20.0-22.0	SAND	0.8	0.4	
	S11	22.0-24.0	SAND	1.0	0.4	
	S12	24.0-26.0	SAND	0.8	0.4	
	S13	26.0-28.0	SAND	0.8	0.4	
	S14	30.0-32.0	CLAY	1.0	0.4	
	S15	32.0-34.0	CLAY	1.0	0.4	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B10	S1	1.0-3.0	FILL	1.0	0.6	
	S2	3.0-5.0	FILL	1.2	0.6	
	S3	5.0-7.0	FILL	1.0	0.6	
	S4	7.0-9.0	FILL	1.0	0.6	
	S5	9.0-11.0	FILL	11.2	0.6	
	S6	11.0-13.0	FILL	8.8	0.6	
	S7	13.0-15.0	FILL	1.2	0.6	
	S8	15.0-17.0	SAND	1.4	0.6	
	S9	17.0-19.0	SAND	1.0	0.6	
	S10	20.0-22.0	CLAY	1.0	0.6	
	S11	22.0-24.0	CLAY	1.0	0.6	
	S12	24.0-26.0	CLAY	1.0	0.6	
	S13	27.0-29.0	CLAY	2.0	0.6	
B11	S1	1.0-3.0	FILL	0.8	0.4	
	S2	3.0-5.0	FILL	0.8	0.4	
	S3	5.0-7.0	FILL	9.2	0.4	
	S4	7.0-9.0	FILL	4.4	0.4	
	S5	9.0-11.0	FILL	3.0	0.4	Petroleum Odor
	S6	11.0-13.0	FILL	3.8	0.4	Petroleum Odor
	S7	13.0-15.0	FILL	40	0.4	Petroleum Odor
	S8	15.0-17.0	SAND	62	0.6	Petroleum Odor
	S9	17.0-19.0	SAND	70	0.6	Petroleum Odor
	S10	20.0-22.0	SAND	10.4	0.6	Petroleum Odor
	S11	22.0-24.0	SAND	26	0.6	Petroleum Odor
	S12	24.0-26.0	CLAY	3.8	0.6	Petroleum Odor
	S13	26.0-28.0	CLAY	5.0	0.6	
	S14	28.0-30.0	CLAY	2.0	0.6	
	S15	30.0-32.0	CLAY	3.0	0.6	
B12	S1	1.0-3.0	FILL	0.8	0.8	
	S2	3.0-5.0	FILL	2.2	0.8	
	S3	5.0-7.0	FILL	2.8	0.8	
	S4	7.0-9.0	FILL	0.8	0.8	
	S5	9.0-11.0	FILL	0.8	0.8	
	S6	11.0-13.0	FILL	1.6	0.8	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B12 (cont.)	S7	13.0-15.0	FILL	4.8	0.8	
	S8	15.0-17.0	FILL/SAND	1.0	0.8	
	S9	17.0-19.0	SAND	1.0	0.8	
	S10	19.0-21.0	SAND	1.0	0.8	
	S11	21.0-22.5	SAND	1.2	0.8	
	S12	25.0-27.0	CLAY	0.8	0.8	
	S13	27.0-29.0	CLAY	0.8	0.8	
B13	S1	1.0-3.0	FILL	1.4	0.4	
	S2	3.0-5.0	FILL	NA	-	
	S3	5.0-7.0	FILL	11.8	0.4	
	S4	7.0-9.0	FILL	4.2	0.4	
	S5	9.0-11.0	FILL	3.0	0.4	
	S6	11.0-13.0	FILL	6.4	0.4	
	S7	13.0-15.0	FILL	9.8	0.4	
	S8	15.0-17.0	SAND	13.4	0.4	
	S9	17.0-19.0	SAND	2.0	0.4	
	S10	20.0-22.0	CLAY	2.2	0.4	
	S11	22.0-24.0	CLAY	2.6	0.4	
B14	S1	1.0-3.0	FILL	1.6	0.4	
	S2	3.0-5.0	FILL	4.0	0.4	
	S3	5.0-7.0	FILL	3.4	0.4	
	S4	7.0-9.0	FILL	4.0	0.4	
	S5	9.0-11.0	FILL	2.2	0.4	
	S6	11.0-13.0	FILL	6.8	0.4	
	S7	13.0-15.0	FILL	5.2	0.4	
	S8	15.0-17.0	FILL/SAND	1.4	0.4	
	S9	17.0-19.0	SAND	1.8	0.4	
	S10	20.0-22.0	SAND	1.8	0.4	
	S11	22.0-24.0	SAND	1.6	0.4	
	S12	24.0-26.0	CLAY	1.6	0.4	
	S13	26.0-28.0	CLAY	1.6	0.4	
B15	S1	1.0-3.0	FILL	1.4	0.4	
	S2	3.0-5.0	FILL	1.2	0.4	
	S3	5.0-7.0	FILL	1.4	0.4	
	S4	7.0-9.0	FILL	5.0	0.6	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B15	S5	10.0-10.5	FILL	7.4	0.6	
(cont.)	S6	13.0-15.0	FILL	2.1	0.6	Petroleum Odor
	S7	15.0-17.0	SAND	3.6	0.6	
	S8	17.0-19.0	SAND	5.4	0.6	
	S9	20.0-22.0	CLAY/SILT	3.2	0.6	
	S10	22.0-24.0	SAND	1.8	0.6	
	S11	24.0-26.0	CLAY	1.6	0.6	
	S12	26.0-28.0	CLAY	2.0	0.6	
B16	S1	1.0-3.0	FILL	1.2	0.6	
	S2	3.0-5.0	FILL	7.0	0.6	
	S3	5.0-7.0	FILL	2.2	0.6	
	S4	7.0-9.0	FILL	2.6	0.6	
	S5	9.0-11.0	FILL	1.0	0.6	
	S6	11.0-130	FILL	2.4	0.6	
	S7	13.0-15.0	FILL	1.2	0.6	
	S8	15.0-17.0	FILL	1.2	0.6	
	S9	17.0-19.0	SAND	1.0	0.6	
	S10	20.0-22.0	SAND	1.2	0.6	
	S11	22.0-24.0	SAND	1.4	0.6	
	S12	25.0-27.0	SAND	1.2	0.6	
	S13	30.0-32.0	CLAY	1.4	0.6	
	S14	32.0-34.0	CLAY	2.0	0.6	
B17	S1	1.0-3.0	FILL	1.0	0.4	
	S2	3.0-5.0	FILL	2.6	0.4	
	S3	5.0-6.3	FILL	8.2	0.4	
	S4	7.0-9.0	FILL	2.0	0.4	
	S5	9.0-11.0	FILL	4.8	0.4	
	S6	11.0-13.0	FILL	2.4	0.4	
	S7	13.0-15.0	SILT	1.0	0.4	
	S8	15.0-17.0	SAND	1.0	0.4	
	S9	17.0-19.0	SAND	1.0	0.4	
	S10	19.0-21.0	SAND	1.0	0.4	
	S11	21.0-23.0	SAND	1.0	0.4	
	S12	25.0-27.0	CLAY	1.2	0.4	
	S13	27.0-29.0	CLAY	1.4	0.4	

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TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B18	S1	1.0-3.0	FILL	1.6	0.6	
	S2	3.0-5.0	FILL	1.0	0.6	
	S3	5.0-7.0	FILL	1.0	0.6	
	S4	7.0-9.0	FILL	1.0	0.6	
	S5	9.0-11.0	FILL	1.0	0.6	
	S6	11.0-13.0	FILL	1.0	0.6	
	S7	13.0-15.0	SILT	1.2	0.6	
	S8	15.0-17.0	SAND	12	0.6	Petroleum Odor
	S9	17.0-19.0	SAND	18.6	0.6	Petroleum Odor
	S10	20.0-22.0	SAND	24	0.6	Petroleum Odor
	S11	22.0-24.0	SAND/CLAY	NA	-	
	S12	24.0-26.0	CLAY	1.4	0.6	
	S13	26.0-28.0	CLAY	1.6	0.6	
B19	S1	1.0-3.0	FILL	1.0	0.4	
	S2	3.0-5.0	FILL	5.4	0.4	
	S3	5.0-7.0	FILL	1.0	0.4	
	S4	7.0-9.0	FILL	1.4	0.4	
	S5	9.0-11.0	FILL	3.0	0.4	
	S6	11.0-13.0	FILL	0.8	0.4	
	S7	13.0-15.0	FILL	1.8	0.4	
	S8	15.0-17.0	SAND	2.8	0.4	
	S9	17.0-19.0	SAND	0.8	0.4	
	S10	20.0-22.0	CLAY	1.0	0.4	
	S11	22.0-24.0	CLAY	0.8	0.4	
	S12	24.0-26.0	CLAY	0.8	0.4	
	S13	26.0-28.0	SAND	1.0	0.4	
	S14	28.0-30.0	CLAY	0.8	0.4	
	S15	30.0-32.0	CLAY	0.8	0.4	
B20	S1	1.0-3.0	FILL	0.4	0.2	
	S2	3.0-3.1	FILL	NA	-	
	S3	5.0-7.0	FILL	1.0	0.2	
	S4	7.0-9.0	FILL	1.4	0.2	
	S5	9.0-11.0	FILL	0.6	0.2	
	S6	11.0-13.0	FILL	0.4	0.2	
	S7	13.0-15.0	FILL	0.6	0.2	
	S8	15.0-17.0	SAND	0.6	0.2	
	S9	17.0-19.0	SAND	0.6	0.2	

- continued -

TABLE III
(Continued)
HNU READING OF HEADSPACE IN SAMPLE JARS
FOR DETECTABLE VOLATILE ORGANIC COMPOUNDS

Parcel 18 and Parcel 18B
Boston, Massachusetts

BORING NUMBER	SAMPLE NUMBER	DEPTH (feet)	SAMPLE TYPE	HNU* SAMPLE (ppm)**	HNU* BACKGROUND (ppm)**	REMARKS
B20 (cont.)	S10	20.0-22.0	SAND	0.4	0.2	
	S11	22.0-24.0	SAND	0.4	0.2	
	S12	24.0-26.0	SAND	0.4	0.2	
	S13	28.0-30.0	CLAY	0.6	0.2	
	S14	30.0-32.0	CLAY	1.0	0.2	

* INSTRUMENT WAS CALIBRATED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDED PROCEDURE USING A CALIBRATION GAS SUPPLIED BY THE MANUFACTURER.

** ppm REPRESENTS CONCENTRATION OF DETECTABLE VOLATILE AND GASEOUS COMPOUNDS IN PARTS PER MILLION OF AIR.

NA VALUES NOT AVAILABLE DUE EITHER TO NO RECOVERY DURING DRILLING OR TO BREAKING OF SAMPLE JAR DURING TRANSPORTING OF SAMPLES.

2095h

TABLE IV 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST PITS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		TP1-S1	TP2-S1	TP3-S2	TP4-S1*	TP5-S1	TP6-S1*	TP7-S1	TP8-S1	TP9-S1	TP10-S1	TP11-S1	TP12-S1*
DATE		28 NOV 88	28 NOV 88	28 NOV 88	28 NOV 88	29 NOV 88	2 DEC 88	30 NOV 88	29 NOV 88	29 NOV 88	30 NOV 88	30 NOV 88	30 NOV 88
DEPTH (Feet)		14.0-14.5	16.0-17.0	15.0-16.0	17.0-17.5	16.0-16.5	13.0-16.0	14.0-16.0	15.5-16.5	14.0-16.0	14.0-16.0	15.0-17.0	16.0-18.0
VOLATILE ORGANICS	UNITS												
Chlorobenzene	ppb	ND	ND	ND	ND	ND	ND	33	ND	ND	ND	ND	ND
Acetone	ppb	ND	ND	ND	ND	ND	210	ND	ND	ND	ND	ND	ND
Methylene Chloride	ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ppb	ND	ND	ND	ND	ND	ND	540	ND	ND	ND	ND	ND
Chloroform	ppb	ND	ND	ND	ND	ND	ND	23	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ppb	ND	ND	ND	ND	ND	ND	41	ND	ND	ND	ND	ND
Benzene	ppb	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethene	ppb	ND	ND	ND	ND	ND	ND	84	ND	ND	ND	ND	ND
Toluene	ppb	ND	ND	ND	ND	ND	ND	34	ND	ND	ND	ND	23
Ethylbenzene	ppb	ND	ND	ND	ND	ND	270	3900	29	ND	ND	ND	100
Trichlorofluoromethane	ppb	ND	ND	ND	ND	ND	41.1	ND	ND	ND	ND	ND	ND
Total xylenes	ppb	ND	ND	ND	ND	ND	680	6700	140	ND	52.9	ND	120
ACID AND BASE/NEUTRAL COMPOUNDS													
Acenaphthene	ppm	0.65	NA	ND	ND	NA	ND	TR	NA	NA	NA	NA	NA
Dibenzofuran	ppm	ND	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Fluoranthene	ppm	0.72	NA	ND	ND	NA	ND	TR	NA	NA	NA	NA	NA
Naphthalene	ppm	ND	NA	ND	ND	NA	0.43	2.6	NA	NA	NA	NA	NA
2-Methylnaphthalene	ppm	ND	NA	ND	ND	NA	1.1	5.7	NA	NA	NA	NA	NA
Benzo(a)Anthracene	ppm	TR	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Benzo(a)Pyrene	ppm	0.48	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	ppm	TR	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	ppm	TR	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Chrysene	ppm	0.44	NA	ND	ND	NA	TR	TR	NA	NA	NA	NA	NA
Anthracene	ppm	ND	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	ppm	ND	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Fluorene	ppm	0.86	NA	ND	ND	NA	ND	0.42	NA	NA	NA	NA	NA
Phenanthrene	ppm	1.8	NA	ND	ND	NA	TR	0.89	NA	NA	NA	NA	NA
Dibenzo(a,h)Anthracene	ppm	ND	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	ppm	ND	NA	ND	ND	NA	ND	ND	NA	NA	NA	NA	NA
Pyrene	ppm	TR	NA	ND	ND	NA	TR	TR	NA	NA	NA	NA	NA

(CONTINUED)

TABLE IV (CONTINUED) [1,2]
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST PITS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		TP1-S1	TP2-S1	TP3-S2	TP4-S1*	TP5-S1	TP6-S1*	TP7-S1	TP8-S1	TP9-S1	TP10-S1	TP11-S1	TP12-S1*
DATE		28 NOV 88	28 NOV 88	28 NOV 88	28 NOV 88	29 NOV 88	2 DEC 88	30 NOV 88	29 NOV 88	29 NOV 88	30 NOV 88	30 NOV 88	30 NOV 88
DEPTH (Feet)		14.0-14.5	16.0-17.0	15.0-16.0	17.0-17.5	16.0-16.5	13.0-16.0	14.0-16.0	15.5-16.5	14.0-16.0	14.0-16.0	15.0-17.0	16.0-18.0
PESTICIDES	UNITS												
Alpha-BHC	ppb	60	ND	ND	ND	NA	ND	110	ND	ND	NA	ND	200
Beta-BHC	ppb	ND	ND	ND	ND	NA	NO	ND	ND	ND	NA	ND	ND
Gamma-BHC	ppb	20	ND	ND	10	NA	ND	ND	ND	ND	NA	ND	150
Heptachlor	ppb	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND
Aldrin	ppb	ND	ND	ND	ND	NA	ND	ND	80	ND	NA	ND	ND
Heptachlor Epoxide	ppb	30	ND	ND	25	NA	ND	50	ND	ND	NA	ND	ND
Endosulfan I	ppb	ND	11	ND	110	NA	ND	110	ND	ND	NA	ND	ND
Dieldrin	ppb	ND	ND	ND	40	NA	ND	ND	ND	NO	NA	ND	ND
4,4'-DDE	ppb	ND	ND	ND	ND	NA	ND	40	ND	ND	NA	ND	ND
Endosulfan Sulfate	ppb	ND	ND	ND	ND	NA	ND	ND	2000	ND	NA	ND	ND
4,4'-DDD	ppb	ND	ND	ND	ND	NA	ND	ND	ND	ND	NA	ND	ND
METALS													
Arsenic	ppm	2.6	3.5	3.7	3.0	4.4	12	3.0	3.7	3.8	4.6	2.7	4.9
Beryllium	ppm	0.4	0.4	0.5	0.4	0.4	0.5	0.3	0.4	0.4	0.5	0.2	0.3
Cadmium	ppm	0.9	0.8	1.0	0.7	0.9	1.0	0.8	0.8	0.8	0.9	0.6	0.9
Chromium	ppm	14	14	17	14	16	24	12	13	13	21	11	15
Copper	ppm	26	31	27	15	31	30	19	21	18	17	14	19
Lead	ppm	6.2	3.6	9.8	2.7	40	154	14	16	11	17	2.8	6.6
Mercury	ppm	0.04	ND	ND	0.09	0.24	0.23	0.06	0.05	ND	0.08	ND	0.04
Nickel	ppm	17	15	20	15	18	21	15	16	15	21	14	18
Selenium	ppm	ND	ND	ND	ND	ND	0.11	ND	ND	ND	ND	ND	ND
Silver	ppm	0.6	0.6	0.6	0.6	0.6	1.0	0.6	0.6	0.6	0.6	ND	0.6
Thallium	ppm	6.0	6.6	8.6	6.0	7.8	8.0	7.0	5.2	5.6	6.8	6.0	6.2
Zinc	ppm	46	30	51	27	62	126	31	37	30	35	33	30
EP TOXICITY													
Arsenic	ppm	ND	NA	ND	ND	NA	0.04	0.007	ND	NA	NA	ND	NA
Barium	ppm	ND	NA	ND	ND	NA	ND	0.12	ND	NA	NA	ND	NA
TOTAL CYANIDE	ppm	NA	NA	<0.7	<0.6	NA	NA	<0.7	NA	NA	NA	NA	NA
PETROLEUM ID (GC/FID)													
Quantity	ppm	200	90	46	81	121	3	316	45	1366	50	55	60
Type		Fuel Oil	Motor Oil	Motor Oil	Motor Oil	Weathered Motor Oil	Kerosene, Motor Oil	Gasoline, Diesel	Motor Oil	Fuel Oil	Motor Oil	Motor Oil	Gasoline, Motor Oil

(CONTINUED)

TABLE IV (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST PITS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE LOCATION		TP13-S1	TP14A-S1*	TP15-S1*	TP16-S2	TP16-S1	TP17-S1	TP18-S1	TP18-S3	TP19-S1	TP20-S1*	TP21-S2
DATE		1 DEC 88	1 DEC 88	30 NOV 88	1 DEC 88	1 DEC 88	1 DEC 88	2 DEC 88	2 DEC 88	2 DEC 88	2 DEC 88	29 NOV 88
DEPTH (Feet)		15.0-17.0	14.0-16.0	9.0-10.0	7.0-9.0	11.0-14.0	18.0-19.0	12.0-14.0	15.0-17.0	13.5-15.5	15.0-17.0	14.0-16.0
VOLATILE ORGANICS	UNITS											
Chlorobenzene	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Acetone	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ppb	ND	ND	ND	NA	ND	ND	ND	ND	27.9	ND	ND
1,2-Dichloroethane	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Chloroform	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Benzene	ppb	ND	ND	ND	NA	ND	49.5	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethene	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Toluene	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ppb	17.0	ND	ND	NA	33.4	ND	ND	ND	ND	ND	570
Trichlorofluoromethane	ppb	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	ND
Total xylenes	ppb	ND	ND	ND	NA	80.1	ND	ND	ND	ND	ND	1500
ACID AND BASE/NEUTRAL COMPOUNDS												
Acenaphthene	ppm	NA	NA	NA	NA	ND	NA	0.52	NA	NA	NA	NA
Dibenzofuran	ppm	NA	NA	NA	NA	ND	NA	TR	NA	NA	NA	NA
Fluoranthene	ppm	NA	NA	NA	NA	TR	NA	6.3	NA	NA	NA	NA
Naphthalene	ppm	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA
2-Methylnaphthalene	ppm	NA	NA	NA	NA	ND	NA	ND	NA	NA	NA	NA
Benzo(a)Anthracene	ppm	NA	NA	NA	NA	ND	NA	1.7	NA	NA	NA	NA
Benzo(a)Pyrene	ppm	NA	NA	NA	NA	ND	NA	2.3	NA	NA	NA	NA
Benzo(b)Fluoranthene	ppm	NA	NA	NA	NA	ND	NA	3	NA	NA	NA	NA
Benzo(k)Fluoranthene	ppm	NA	NA	NA	NA	ND	NA	3	NA	NA	NA	NA
Chrysene	ppm	NA	NA	NA	NA	TR	NA	3.7	NA	NA	NA	NA
Anthracene	ppm	NA	NA	NA	NA	ND	NA	0.97	NA	NA	NA	NA
Benzo(g,h,i)Perylene	ppm	NA	NA	NA	NA	ND	NA	1.1	NA	NA	NA	NA
Fluorene	ppm	NA	NA	NA	NA	ND	NA	0.56	NA	NA	NA	NA
Phenanthrene	ppm	NA	NA	NA	NA	TR	NA	5	NA	NA	NA	NA
Dibenzo(a,h)Anthracene	ppm	NA	NA	NA	NA	ND	NA	0.58	NA	NA	NA	NA
Indeno(1,2,3-cd)Pyrene	ppm	NA	NA	NA	NA	ND	NA	0.93	NA	NA	NA	NA
Pyrene	ppm	NA	NA	NA	NA	TR	NA	2.7	NA	NA	NA	NA

(CONTINUED)

TABLE IV (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST PITS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE LOCATION		TP13-S1	TP14A-S1*	TP15-S1*	TP16-S2	TP16-S1	TP17-S1	TP18-S1	TP18-S3	TP19-S1	TP20-S1*	TP21-S2
DATE		1 DEC 88	1 DEC 88	30 NOV 88	1 DEC 88	1 DEC 88	1 DEC 88	2 DEC 88	2 DEC 88	2 DEC 88	2 DEC 88	29 NOV 88
DEPTH (Feet)		15.0-17.0	14.0-16.0	9.0-10.0	7.0-9.0	11.0-14.0	18.0-19.0	12.0-14.0	15.0-17.0	13.5-15.5	15.0-17.0	14.0-16.0
PESTICIDES	UNITS											
Alpha-BHC	ppb	NA	ND	400	ND	ND	ND	ND	ND	NA	ND	NA
Beta-BHC	ppb	NA	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA
Gamma-BHC	ppb	NA	ND	180	ND	ND	ND	ND	10	NA	ND	NA
Heptachlor	ppb	NA	ND	225	ND	ND	ND	ND	ND	NA	ND	NA
Aldrin	ppb	NA	ND	50	ND	ND	ND	ND	ND	NA	ND	NA
Heptachlor Epoxide	ppb	NA	ND	ND	ND	ND	85	ND	12	NA	ND	NA
Endosulfan I	ppb	NA	ND	ND	ND	ND	50	ND	50	NA	ND	NA
Dieldrin	ppb	NA	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA
4,4'-DDE	ppb	NA	ND	ND	ND	ND	50	ND	19	NA	ND	NA
Endosulfan Sulphate	ppb	NA	ND	ND	ND	ND	ND	24	ND	NA	ND	NA
4,4'-DDD	ppb	NA	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA
METALS												
Arsenic	ppm	3.7	3.4	5.4	NA	24	14	3.2	3.6	1.9	2.5	4.2
Beryllium	ppm	0.5	0.5	0.5	NA	0.5	0.5	0.4	0.4	0.2	0.5	0.5
Cadmium	ppm	1.0	1.0	1.2	NA	1.3	1.7	0.9	1.0	0.7	0.9	1.0
Chromium	ppm	22	18	18	NA	25	20	15	21	12	16	20
Copper	ppm	28	30	36	NA	180	94	27	26	14	26	26
Lead	ppm	48	7.4	158	NA	494	640	44	3.0	3.2	13	16
Mercury	ppm	ND	ND	2.44	NA	0.9	1.48	0.15	0.09	ND	0.05	0.08
Nickel	ppm	21	21	23	NA	24	19	17	19	13	19	22
Selenium	ppm	ND	ND	0.2	NA	1.0	1.2	ND	ND	ND	ND	ND
Silver	ppm	0.6	0.8	1.2	NA	1.6	0.9	0.6	0.6	ND	0.8	0.6
Thallium	ppm	8.8	7.8	8.4	NA	7.2	8.0	8.0	8.2	5.2	6.8	8.0
Zinc	ppm	46	41	286	NA	168	308	74	57	24	43	44
EP TOXICITY												
Arsenic	ppm	NA	NA	NA	NA	0.01	NA	NA	0.007	NA	NA	NA
Barium	ppm	NA	NA	NA	NA	0.14	NA	NA	ND	NA	NA	NA
TOTAL CYANIDE	ppm	NA	NA	<0.7	NA	NA	NA	<1.25	NA	NA	NA	<0.4
PETROLEUM ID (GC/FID)												
Quantity	ppm	157	144	2128	940	142	483	56	700	1460	45	55
Type		Motor Oil	Motor Oil	Motor Oil, Gear Oil	Gasoline, Motor Oil, Gear Oil	Kerosene, Motor oil, Gear Oil	Motor Oil	Motor Oil, Kerosene	Weathered Gear Oil	Kerosene	Motor Oil	Motor Oil

NOTES: 1-Listing includes only those compounds detected.
2-Refer to Appendix G for laboratory data sheets.
NA-Not Analyzed
ND-Not Detected
TR-Concentration below listed detection limit.
ppb-parts per billion
ppm-parts per million
*-Natural soil strata based on interpretation of boring data.

TABLE V 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B1-S6*	B2B-S5*	B3-S7*	B3B-S5	B3B-S8	B3B-S12*	B4-S6	B4-S11*	B5-S4	B5-S7	B6-S8
DATE		3 OCT 88	4 OCT 88	7 OCT 88	3 JAN 89	3 JAN 89	3 JAN 89	19 DEC 88	19 DEC 88	20 DEC 88	20 DEC 88	21 DEC 88
DEPTH (Feet)		16.0-18.0	14.0-16.0	18.0-20.0	9.0-11.0	15.0-17.0	24.0-26.0	11.0-12.5	21.0-23.0	7.0-9.0	13.0-15.0	15.0-17.0
VOLATILE ORGANICS	UNITS											
Chlorobenzene	ppb	NA	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
Acetone	ppb	NA	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
Methylene Chloride	ppb	NA	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ppb	NA	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
Benzene	ppb	NA	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethene	ppb	NA	NA	ND	ND	NA	ND	ND	ND	ND	ND	ND
Ethylbenzene	ppb	NA	NA	1800	ND	NA	ND	ND	ND	ND	ND	6700
Total xylenes	ppb	NA	NA	7400	ND	NA	ND	ND	ND	ND	ND	11000
ACID AND BASE/NEUTRAL COMPOUNDS												
Naphthalene	ppm	ND	NA	ND	NA	NA	NA	ND	NA	ND	NA	4.1
2-Methylnaphthalene	ppm	ND	NA	ND	NA	NA	NA	ND	NA	ND	NA	9.2
Bis(2-Ethylhexyl)Phthalate	ppm	ND	NA	ND	NA	NA	NA	ND	NA	ND	NA	1.1
Chrysene	ppm	ND	NA	ND	NA	NA	NA	TR	NA	ND	NA	ND
Phenanthrene	ppm	ND	NA	ND	NA	NA	NA	ND	NA	ND	NA	0.61
PESTICIDES												
Alpha-BHC	ppb	NA	ND	NA	NA	ND	NA	ND	NA	NA	ND	57
Beta-BHC	ppb	NA	ND	NA	NA	146	NA	ND	NA	NA	ND	ND
Gamma-BHC	ppb	NA	ND	NA	NA	ND	NA	ND	NA	NA	ND	ND
Heptachlor	ppb	NA	ND	NA	NA	39	NA	12	NA	NA	127	88
Aldrin	ppb	NA	ND	NA	NA	ND	NA	ND	NA	NA	ND	ND
Heptachlor Epoxide	ppb	NA	ND	NA	NA	ND	NA	ND	NA	NA	ND	ND
Methoxychlor	ppb	NA	ND	NA	NA	ND	NA	ND	NA	NA	ND	ND
Dieldrin	ppb	NA	ND	NA	NA	72	NA	ND	NA	NA	ND	71
4,4'-DDE	ppb	NA	ND	NA	NA	ND	NA	23	NA	NA	ND	ND
4,4'-DDD	ppb	NA	ND	NA	NA	ND	NA	33	NA	NA	ND	ND
4,4'-DDT	ppb	NA	ND	NA	NA	56	NA	ND	NA	NA	ND	ND

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B1-S6*	B2B-S5*	B3-S7*	B3B-S5	B3B-S8	B3B-S12*	B4-S6	B4-S11*	B5-S4	B5-S7	B6-S8
DATE		3 OCT 88	4 OCT 88	7 OCT 88	3 JAN 89	3 JAN 89	3 JAN 89	19 DEC 88	19 DEC 88	20 DEC 88	20 DEC 88	21 DEC 88
DEPTH (Feet)		16.0-18.0	14.0-16.0	18.0-20.0	9.0-11.0	15.0-17.0	24.0-26.0	11.0-12.5	21.0-23.0	7.0-9.0	13.0-15.0	15.0-17.0
METALS												
Arsenic	ppm	NA	NA	NA	NA	NA	NA	2.9	2.5	8.2	6.7	2.3
Beryllium	ppm	NA	NA	NA	NA	NA	NA	0.3	0.24	0.2	0.6	0.2
Cadmium	ppm	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
Chromium	ppm	NA	NA	NA	NA	NA	NA	25	16	13	37	16
Copper	ppm	NA	NA	NA	NA	NA	NA	28	16	16	22	18
Lead	ppm	NA	NA	NA	NA	NA	NA	15	5	49	10	7
Mercury	ppm	NA	NA	NA	NA	NA	NA	0.048	0.10	0.17	0.041	ND
Nickel	ppm	NA	NA	NA	NA	NA	NA	28	9	8	23	13
Selenium	ppm	NA	NA	NA	NA	NA	NA	ND	ND	0.22	ND	ND
Silver	ppm	NA	NA	NA	NA	NA	NA	4.4	2.8	5	6	4
Thallium	ppm	NA	NA	NA	NA	NA	NA	ND	ND	ND	ND	ND
Zinc	ppm	NA	NA	NA	NA	NA	NA	46	31	59	61	34
EP TOXICITY												
Arsenic	ppm	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
Barium	ppm	NA	ND	ND	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL CYANIDE	ppm	NA	NA	<0.7	NA	NA	NA	NA	NA	NA	NA	<0.7
TPH BY IR	ppm	45	56	ND	NA	NA	NA	370	540	320	880	330
PETROLEUM ID (GC/FID)												
Quantity	ppm	ND	NA	ND	72	15	117	16	NA	NA	22	201
Type		ND	NA	ND	Weathered Fuel Oil	Weathered Fuel Oil	Weathered Fuel Oil	Weathered Petroleum	NA	NA	Weathered Petroleum	#2 Fuel Oil

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B6-S11*	B7-S3	B7-S6	B7-S8*	B7-S9*	B7-S12*	B8-S3	B8-S8	B8-S10	B8-S11*	B9-S8*
DATE		21 DEC 88	21 DEC 88	22 DEC 88	22 DEC 88	22 DEC 88	22 DEC 88	22 DEC 88	23 DEC 88	23 DEC 88	23 DEC 88	11 JAN 89
DEPTH (Feet)		21.0-23.0	5.0-7.0	11.0-13.0	15.0-17.0	17.0-19.0	24.0-26.0	5.0-7.0	15.0-17.0	21.0-23.0	23.0-25.0	15.0-17.0
VOLATILE ORGANICS	UNITS											
Chlorobenzene	ppb	ND	NA	ND	ND	NA	ND	NA	NA	ND	NA	ND
Acetone	ppb	ND	NA	ND	ND	NA	34.4	NA	NA	ND	NA	ND
Methylene Chloride	ppb	ND	NA	ND	ND	NA	ND	NA	NA	ND	NA	ND
1,1,1-Trichloroethane	ppb	ND	NA	310	ND	NA	47.8	NA	NA	ND	NA	ND
Benzene	ppb	3.2	NA	ND	ND	NA	ND	NA	NA	ND	NA	ND
1,1,2,2-Tetrachloroethene	ppb	ND	NA	ND	ND	NA	ND	NA	NA	ND	NA	ND
Ethylbenzene	ppb	ND	NA	ND	ND	NA	ND	NA	NA	ND	NA	ND
Total xylenes	ppb	21.5	NA	ND	ND	NA	ND	NA	NA	ND	NA	ND
ACID AND BASE/NEUTRAL COMPOUNDS												
Naphthalene	ppm	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA
2-Methylnaphthalene	ppm	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	ppm	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA
Chrysene	ppm	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA
Phenanthrene	ppm	NA	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA
PESTICIDES												
Alpha-BHC	ppb	NA	125	NA	NA	ND	ND	18	ND	NA	ND	ND
Beta-BHC	ppb	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	17
Gamma-BHC	ppb	NA	ND	NA	NA	ND	ND	ND	11	NA	ND	ND
Heptachlor	ppb	NA	ND	NA	NA	ND	ND	18	ND	NA	ND	ND
Aldrin	ppb	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND
Heptachlor Epoxide	ppb	NA	78	NA	NA	ND	ND	ND	ND	NA	ND	ND
Methoxychlor	ppb	NA	ND	NA	NA	ND	ND	ND	430	NA	ND	ND
Dieldrin	ppb	NA	ND	NA	NA	ND	ND	ND	ND	NA	114	ND
4,4'-DDE	ppb	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND
4,4'-DDD	ppb	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND
4,4'-DDT	ppb	NA	ND	NA	NA	ND	ND	ND	ND	NA	ND	ND

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B6-S11*	B7-S3	B7-S6	B7-S8*	B7-S9*	B7-S12*	B8-S3	B8-S8	B8-S10	B8-S11*	B9-S8*
DATE		21 DEC 88	21 DEC 88	22 DEC 88	22 DEC 88	22 DEC 88	22 DEC 88	22 DEC 88	23 DEC 88	23 DEC 88	23 DEC 88	11 JAN 89
DEPTH (Feet)		21.0-23.0	5.0-7.0	11.0-13.0	15.0-17.0	17.0-19.0	24.0-26.0	5.0-7.0	15.0-17.0	21.0-23.0	23.0-25.0	15.0-17.0
METALS												
Arsenic	ppm	7.4	NA	NA	NA	2.0	NA	NA	2.7	NA	NA	NA
Beryllium	ppm	0.1	NA	NA	NA	0.4	NA	NA	0.1	NA	NA	NA
Cadmium	ppm	ND	NA	NA	NA	ND	NA	NA	ND	NA	NA	NA
Chromium	ppm	15	NA	NA	NA	11	NA	NA	13	NA	NA	NA
Copper	ppm	24	NA	NA	NA	10	NA	NA	17	NA	NA	NA
Lead	ppm	4	NA	NA	NA	ND	NA	NA	42	NA	NA	NA
Mercury	ppm	ND	NA	NA	NA	ND	NA	NA	0.23	NA	NA	NA
Nickel	ppm	11	NA	NA	NA	10	NA	NA	11	NA	NA	NA
Selenium	ppm	ND	NA	NA	NA	ND	NA	NA	0.1	NA	NA	NA
Silver	ppm	4	NA	NA	NA	ND	NA	NA	3	NA	NA	NA
Thallium	ppm	ND	NA	NA	NA	7	NA	NA	ND	NA	NA	NA
Zinc	ppm	47	NA	NA	NA	17	NA	NA	44	NA	NA	NA
EP TOXICITY												
Arsenic	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL CYANIDE	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TPH BY IR	ppm	56	NA	NA	NA	900	NA	NA	4100	NA	NA	1
PETROLEUM ID (GC/FID)												
Quantity	ppm	NA	107	NA	NA	7	9	811	606	NA	374	130
Type		NA	Highly Weathered Petroleum	NA	NA	Weathered Fuel Oil	Weathered Fuel Oil	Motor Oil	Motor Oil	NA	Motor Oil	Weathered Motor Oil

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B10-S10*	B10-S11*	B11-S1	B11-S5	B11-S9*	B11-S12*	B12-S4	B12-S8*	B13-S3	B13-S6	B13-S9*
DATE		10 JAN 89	10 JAN 89	9 JAN 89	9 JAN 89	10 JAN 89	10 JAN 89	27 DEC 88	27 DEC 88	28 DEC 88	29 DEC 88	29 DEC 88
DEPTH (Feet)		20.0-22.0	22.0-24.0	1.0-3.0	9.0-11.0	17.0-19.0	24.0-26.0	7.0-9.0	15.0-17.0	5.0-7.0	11.0-13.0	17.0-19.0
VOLATILE ORGANICS	UNITS											
Chlorobenzene	ppb	ND	NA	NA	ND	41	ND	NA	ND	NA	NA	ND
Acetone	ppb	ND	NA	NA	ND	ND	ND	NA	ND	NA	NA	ND
Methylene Chloride	ppb	ND	NA	NA	ND	ND	ND	NA	ND	NA	NA	2.3
1,1,1-Trichloroethane	ppb	ND	NA	NA	ND	46	ND	NA	ND	NA	NA	ND
Benzene	ppb	ND	NA	NA	ND	ND	ND	NA	ND	NA	NA	ND
1,1,2,2-Tetrachloroethene	ppb	ND	NA	NA	ND	77	ND	NA	ND	NA	NA	ND
Ethylbenzene	ppb	ND	NA	NA	ND	3500	ND	NA	ND	NA	NA	ND
Total xylenes	ppb	ND	NA	NA	ND	6200	113	NA	ND	NA	NA	ND
ACID AND BASE/NEUTRAL COMPOUNDS												
Naphthalene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
2-Methylnaphthalene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
Bis(2-Ethylhexyl)Phthalate	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
Chrysene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
Phenanthrene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND
PESTICIDES												
Alpha-BHC	ppb	ND	NA	ND	NA	ND	ND	NA	ND	29	NA	139
Beta-BHC	ppb	ND	NA	ND	NA	ND	ND	NA	ND	44	NA	572
Gamma-BHC	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
Heptachlor	ppb	ND	NA	12	NA	ND	ND	NA	ND	29	NA	ND
Aldrin	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
Heptachlor Epoxide	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
Methoxychlor	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
Dieldrin	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
4,4'-DDE	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
4,4'-DDD	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND
4,4'-DDT	ppb	ND	NA	ND	NA	ND	ND	NA	ND	ND	NA	ND

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 188
Boston, Massachusetts

SAMPLE DATE DEPTH (Feet)		B10-S10* 10 JAN 89 20.0-22.0	B10-S11* 10 JAN 89 22.0-24.0	B11-S1 9 JAN 89 1.0-3.0	B11-S5 9 JAN 89 9.0-11.0	B11-S9* 10 JAN 89 17.0-19.0	B11-S12* 10 JAN 89 24.0-26.0	B12-S4 27 DEC 88 7.0-9.0	B12-S8* 27 DEC 88 15.0-17.0	B13-S3 28 DEC 88 5.0-7.0	B13-S6 29 DEC 88 11.0-13.0	B13-S9* 29 DEC 88 17.0-19.0
METALS												
Arsenic	ppm	NA	20	NA	NA	7	NA	113	NA	NA	NA	NA
Beryllium	ppm	NA	0.9	NA	NA	0.5	NA	0.8	NA	NA	NA	NA
Cadmium	ppm	NA	ND	NA	NA	ND	NA	0.3	NA	NA	NA	NA
Chromium	ppm	NA	45	NA	NA	18	NA	24	NA	NA	NA	NA
Copper	ppm	NA	25	NA	NA	17	NA	375	NA	NA	NA	NA
Lead	ppm	NA	5.5	NA	NA	ND	NA	1460	NA	NA	NA	NA
Mercury	ppm	NA	ND	NA	NA	ND	NA	2.1	NA	NA	NA	NA
Nickel	ppm	NA	24	NA	NA	10	NA	20	NA	NA	NA	NA
Selenium	ppm	NA	0.38	NA	NA	0.14	NA	0.7	NA	NA	NA	NA
Silver	ppm	NA	1.2	NA	NA	0.6	NA	1.5	NA	NA	NA	NA
Thallium	ppm	NA	15	NA	NA	7.5	NA	11	NA	NA	NA	NA
Zinc	ppm	NA	48	NA	NA	30	NA	243	NA	NA	NA	NA
EP TOXICITY												
Arsenic	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL CYANIDE	ppm	NA	<0.8	NA	NA	NA	NA	NA	<0.7	NA	NA	NA
TPH BY IR	ppm	80	NA	NA	NA	100	NA	NA	NA	NA	NA	43
PETROLEUM ID (GC/FID)												
Quantity	ppm	96	NA	NA	124	88	85	NA	19	NA	56	47
Type		Weathered Motor Oil	NA	NA	Weathered Motor Oil	Weathered Motor Oil	Weathered Motor Oil	NA	Weathered Fuel Oil	NA	Weathered Fuel Oil	Weathered Fuel Oil

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B13-S10*	B14-S3	B14-S8*	B14-S11*	B15-S4	B15-S7*	B15-S9*	B16-S2	B16-S9*	B16-S11*	B17-S2
DATE		29 DEC 88	28 DEC 88	28 DEC 88	28 DEC 88	30 DEC 88	30 DEC 88	30 DEC 88	3 JAN 89	4 JAN 89	4 JAN 89	6 JAN 89
DEPTH (Feet)		20.0-22.0	5.0-7.0	15.0-17.0	22.0-24.0	7.0-9.0	15.0-17.0	20.0-22.0	3.0-5.0	17.0-19.0	22.0-24.0	3.0-5.0
VOLATILE ORGANICS	UNITS											
Chlorobenzene	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
Acetone	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
Methylene Chloride	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
1,1,1-Trichloroethane	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
Benzene	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
1,1,2,2-Tetrachloroethene	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
Ethylbenzene	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
Total xylenes	ppb	NA	NA	ND	NA	NA	ND	NA	NA	ND	NA	NA
ACID AND BASE/NEUTRAL COMPOUNDS												
Naphthalene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES												
Alpha-BHC	ppb	ND	ND	ND	ND	ND	28	ND	NA	35	NA	ND
Beta-BHC	ppb	ND	ND	ND	ND	ND	ND	1032	NA	ND	NA	ND
Gamma-BHC	ppb	ND	ND	ND	ND	29	ND	ND	NA	ND	NA	ND
Heptachlor	ppb	616	11.91	ND	ND	128	ND	ND	NA	ND	NA	ND
Aldrin	ppb	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND
Heptachlor Epoxide	ppb	ND	12.58	ND	ND	35	ND	ND	NA	ND	NA	ND
Methoxychlor	ppb	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND
Dieldrin	ppb	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND
4,4'-DDE	ppb	ND	ND	ND	ND	ND	ND	47	NA	ND	NA	ND
4,4'-DDD	ppb	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND
4,4'-DDT	ppb	ND	ND	ND	ND	ND	ND	ND	NA	ND	NA	ND

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 188
Boston, Massachusetts

SAMPLE DATE DEPTH (Feet)		B13-S10* 29 DEC 88 20.0-22.0	B14-S3 28 DEC 88 5.0-7.0	B14-S8* 28 DEC 88 15.0-17.0	B14-S11* 28 DEC 88 22.0-24.0	B15-S4 30 DEC 88 7.0-9.0	B15-S7* 30 DEC 88 15.0-17.0	B15-S9* 30 DEC 88 20.0-22.0	B16-S2 3 JAN 89 3.0-5.0	B16-S9* 4 JAN 89 17.0-19.0	B16-S11* 4 JAN 89 22.0-24.0	B17-S2 6 JAN 89 3.0-5.0
METALS												
Arsenic	ppm	6.1	NA	NA	3.2	NA	NA	NA	NA	NA	NA	NA
Beryllium	ppm	0.8	NA	NA	0.4	NA	NA	NA	NA	NA	NA	NA
Cadmium	ppm	ND	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Chromium	ppm	36	NA	NA	17	NA	NA	NA	NA	NA	NA	NA
Copper	ppm	23	NA	NA	15	NA	NA	NA	NA	NA	NA	NA
Lead	ppm	ND	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Mercury	ppm	ND	NA	NA	0.1	NA	NA	NA	NA	NA	NA	NA
Nickel	ppm	49	NA	NA	16	NA	NA	NA	NA	NA	NA	NA
Selenium	ppm	ND	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Silver	ppm	3.5	NA	NA	ND	NA	NA	NA	NA	NA	NA	NA
Thallium	ppm	16	NA	NA	9	NA	NA	NA	NA	NA	NA	NA
Zinc	ppm	44	NA	NA	25	NA	NA	NA	NA	NA	NA	NA
EP TOXICITY												
Arsenic	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Barium	ppm	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL CYANIDE	ppm	NA	NA	<0.8	NA	NA	NA	NA	NA	NA	NA	NA
TPH BY IR	ppm	NA	NA	50	NA	NA	NA	NA	NA	NA	NA	NA
PETROLEUM ID (GC/FID)												
Quantity	ppm	NA	NA	1	NA	201	45	41	7	128	99	176
Type		NA	NA	Highly Weathered Petroleum	NA	Weathered Fuel Oil	Weathered Fuel Oil	Weathered Fuel Oil	Weathered Fuel, Motor Oil	Weathered Fuel, Motor Oil	Weathered Fuel, Motor Oil	Weathered Motor Oil

(CONTINUED)

TABLE V (CONTINUED) [1,2]
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE		B17-S8*	B17-S11*	B18-S6	B18-S10*	B18-S12*	B19-S5	B19-S9*	B20-S8*
DATE		9 JAN 89	9 JAN 89	5 JAN 89	5 JAN 89	5 JAN 89	12 JAN 89	12 JAN 89	13 JAN 89
DEPTH (Feet)		15.0-17.0	21.0-23.0	11.0-13.0	20.0-22.0	24.0-26.0	9.0-11.0	17.0-19.0	15.0-17.0
VOLATILE ORGANICS	UNITS								
Chlorobenzene	ppb	NA	NA	ND	ND	ND	NA	NA	NA
Acetone	ppb	NA	NA	ND	ND	ND	NA	NA	NA
Methylene Chloride	ppb	NA	NA	ND	ND	ND	NA	NA	NA
1,1,1-Trichloroethane	ppb	NA	NA	ND	ND	ND	NA	NA	NA
Benzene	ppb	NA	NA	ND	ND	ND	NA	NA	NA
1,1,2,2-Tetrachloroethene	ppb	NA	NA	ND	ND	ND	NA	NA	NA
Ethylbenzene	ppb	NA	NA	ND	ND	ND	NA	NA	NA
Total xylenes	ppb	NA	NA	ND	ND	ND	NA	NA	NA
ACID AND BASE/NEUTRAL COMPOUNDS									
Naphthalene	ppm	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl)Phthalate	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	ppm	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES									
Alpha-BHC	ppb	ND	ND	NA	75	NA	NA	NA	NA
Beta-BHC	ppb	ND	15	NA	ND	NA	NA	NA	NA
Gamma-BHC	ppb	ND	ND	NA	51	NA	NA	NA	NA
Heptachlor	ppb	ND	ND	NA	544	NA	NA	NA	NA
Aldrin	ppb	ND	15	NA	167	NA	NA	NA	NA
Heptachlor Epoxide	ppb	ND	ND	NA	ND	NA	NA	NA	NA
Methoxychlor	ppb	ND	ND	NA	ND	NA	NA	NA	NA
Dieldrin	ppb	ND	ND	NA	ND	NA	NA	NA	NA
4,4'-DDE	ppb	ND	ND	NA	ND	NA	NA	NA	NA
4,4'-DDD	ppb	ND	ND	NA	ND	NA	NA	NA	NA
4,4'-DDT	ppb	ND	ND	NA	ND	NA	NA	NA	NA

(CONTINUED)

TABLE V (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR SOILS FROM TEST BORINGS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SAMPLE DATE DEPTH (Feet)		B17-S8* 9 JAN 89 15.0-17.0	B17-S11* 9 JAN 89 21.0-23.0	B18-S6 5 JAN 89 11.0-13.0	B18-S10* 5 JAN 89 20.0-22.0	B18-S12* 5 JAN 89 24.0-26.0	B19-S5 12 JAN 89 9.0-11.0	B19-S9* 12 JAN 89 17.0-19.0	B20-S8* 13 JAN 89 15.0-17.0
METALS									
Arsenic	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Copper	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Lead	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Silver	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Thallium	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	ppm	NA	NA	NA	NA	NA	NA	NA	NA
EP TOXICITY									
Arsenic	ppm	NA	NA	NA	NA	NA	NA	NA	NA
Barium	ppm	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL CYANIDE	ppm	<0.7	NA	NA	NA	NA	NA	NA	<0.6
TPH BY IR	ppm	NA	NA	NA	93	NA	NA	NA	NA
PETROLEUM ID (GC/FID)									
Quantity	ppm	152	68	88	105	110	136	77	NA
Type		Motor, Gear Oil	Weathered Motor Oil	Weathered Fuel, Motor Oil	Weathered Fuel, Motor Oil	Weathered Fuel, Motor Oil	Motor, Gear Oil	Weathered Motor Oil	NA

NOTES: 1-Listing includes only those compounds detected.
2-Refer to Appendix G for laboratory data sheets.
NA-Not Analyzed
ND-Not Detected
TR-Concentration below listed detection limit.
ppb-parts per billion
ppm-parts per million
*-Natural soil strata based on interpretation of boring data.

TABLE V-B [1,2]

CHEMICAL ANALYSIS DATA FOR SURFACE SOILS

Parcel 18 and Parcel 18B

Boston, Massachusetts

SECTION [3]		I	II	III	IV	V	VI	VII	VIII	IX	X	XI
DATE		4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	5 May 89	5 May 89	5 May 89
ACID AND BASE/NEUTRAL COMPOUNDS	UNITS											
Acenaphthene	ppb	ND	ND	ND	1300	ND	ND	6200	ND	ND	ND	1900
Anthracene	ppb	6100	3200	ND	14000	2000	ND	75000	ND	ND	2500	19000
Benzo(b)fluoranthene	ppb	1800	ND	ND	4300	ND	7600	ND	ND	ND	ND	ND
Benzo(k)fluoranthene	ppb	1800*	ND	ND	4300*	ND	7600*	ND	ND	ND	ND	ND
Benzo(a)pyrene	ppb	1800	ND	ND	3200	ND	5300	12000	ND	ND	ND	4100
Bis(2-ethylhexyl)phthala	ppb	ND	ND	ND	1200	2300	3900	1300	800	1000	ND	800
Chrysene	ppb	2800	1300	ND	5500	1700	4300	21000	ND	1000	1900	8200
Di-n-butylphthalate	ppb	ND	ND	ND	ND	ND	2800	ND	ND	ND	ND	ND
Di-n-octyl phthalate	ppb	ND	ND	ND	1200	ND	7100	ND	ND	ND	ND	ND
Fluorene	ppb	ND	ND	ND	1600	ND	ND	6400	ND	ND	ND	1600
Naphthalene	ppb	ND	ND	ND	ND	ND	ND	5800	ND	ND	ND	850
Phenanthrene	ppb	6100	3200	ND	14000	2000	2300	75000	ND	2900	2500	19000
Pyrene	ppb	5600	2400	ND	10000	1700	3200	49000	ND	4100	2700	15000
PESTICIDES												
Heptachlor Epoxide	ppb	130	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Aldrin	ppb	ND	69	72	91	51	62	288	ND	91	124	187
4,4'-DDE	ppb	ND	ND	ND	ND	ND	ND	ND	67	ND	76	ND
Endosulfan I	ppb	ND	ND	ND	ND	ND	ND	ND	ND	72	ND	ND
4,4'-DDT	ppb	ND	ND	ND	154	ND	ND	ND	ND	ND	ND	241
PCBs												
AROCLOR-1260	ppb	302	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

(CONTINUED)

TABLE V-B (CONTINUED)
CHEMICAL ANALYSIS DATA FOR SURFACE SOILS

Parcel 18 and Parcel 18B
Boston, Massachusetts

SECTION		I	II	III	IV	V	VI	VII	VIII	IX	X	XI
DATE		4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	4 May 89	5 May 89	5 May 89	5 May 89
METALS												
Arsenic	ppm	4.8	4.9	4.8	6.9	9.4	5.1	5.9	6.2	7.5	8.3	16
Beryllium	ppm	0.55	0.65	0.7	0.6	0.9	0.5	0.7	0.6	0.7	0.55	0.65
Cadmium	ppm	0.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ppm	23	35	26	26	24	21	20	28	28	17	21
Copper	ppm	60	23	23	27	25	14	23	18	20	27	40
Lead	ppm	75	56	57	94	115	53	71	63	108	103	141
Mercury	ppm	0.47	0.38	3.4	0.41	1.3	0.2	0.39	0.2	0.44	0.65	0.43
Nickel	ppm	12	16	12	15	13	9	13	11	16	10	13
Selenium	ppm	0.15	0.15	0.28	0.18	0.2	ND	0.31	0.15	0.085	0.41	ND
Thallium	ppm	9.0	7.5	11	10	11	9	7.5	7.5	10	9.0	9.5
Zinc	ppm	71	61	67	80	118	67	72	53	88	66	110
CYANIDE	ppm	<1	NA	NA	NA	<1	NA	<1	NA	NA	NA	<1

NOTES: 1-Listing includes only those compounds detected.
2-Refer to Appendix G for laboratory data sheets.
3-Soils from a depth of 1 to 4 ft. at five sampling points in each section were composited.
*-Benzo(b)fluoranthene and benzo(a)fluoranthene were coeluted.

ppm-parts per million
ppb-parts per billion
NA-Not Analyzed
ND-Not Detected

TABLE VI (1,2)
CHEMICAL ANALYSIS DATA FOR GROUNDWATER

Parcel 18 and Parcel 188
Boston, Massachusetts

OBSERVATION WELL		B1-OW	B2B-OW	B3B-OW	B4-OW	B5-OW	B6-OW	B7-OW	B8-OW
DATE		9 FEB 89	8 FEB 89	7 FEB 89	7 FEB 89	8 FEB 89	9 FEB 89	8 FEB 89	8 FEB 89
WATER LEVEL (Feet)		12.2	15.0	15.3	18.1	15.7	18.9	17.4	21.5
VOLATILE ORGANICS	UNITS								
Chlorobenzene	ppb	ND	ND	ND	ND	4.6	ND	ND	ND
Acetone	ppb	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ppb	ND	ND	ND	ND	ND	ND	ND	ND
Ethyl benzene	ppb	ND	ND	620	ND	66.4	10.1	ND	ND
Total xylenes	ppb	ND	ND	500	ND	58.9	23.7	ND	ND
PESTICIDES									
Alpha-BHC	ppb	0.80	ND	NA	0.80	0.5	ND	3	ND
Beta-BHC	ppb	0.55	ND	NA	0.37	ND	0.49	ND	ND
Gamma-BHC	ppb	ND	0.1	NA	ND	ND	ND	2	0.1
Heptachlor	ppb	ND	0.5	NA	ND	0.1	ND	ND	0.3
Endosulphan II	ppb	ND	1.0	NA	ND	ND	ND	ND	0.7
Dieldrin	ppb	ND	ND	NA	ND	ND	ND	ND	ND
Endosulfan sulfate	ppb	1.17	ND	NA	0.12	ND	ND	ND	ND
4,4'-DDD	ppb	ND	0.1	NA	ND	ND	ND	ND	ND
METALS									
Nickel	ppm	0.18	NA	NA	NA	NA	0.23	NA	NA
Zinc	ppm	0.006	NA	NA	NA	NA	ND	NA	NA
TOTAL CYANIDE	ppm	<0.01	NA	NA	NA	NA	<0.01	NA	NA
TPH BY IR	ppm	2	NA	NA	NA	NA	2	NA	NA
PETROLEUM ID									
Quantity	ppm	<1	NA	6	NA	NA	<1	NA	<1
Type		ND	NA	GASOLINE, MOTOR OIL	NA	NA	TRACE GASOLINE	NA	ND

(CONTINUED)

TABLE VI (CONTINUED) 1,2
CHEMICAL ANALYSIS DATA FOR GROUNDWATER

Parcel 18 and Parcel 18B
Boston, Massachusetts

OBSERVATION WELL		B9-OW	B10-OW	B11-OW	B13-OW	B15-OW	B16-OW	B19-OW
DATE		8 FEB 89	8 FEB 89	9 FEB 89	8 FEB 89	7 FEB 89	7 FEB 89	8 FEB 89
WATER LEVEL (Feet)		15.5	21.7	17.0	16.1	15.3	14.6	17.1
VOLATILE ORGANICS	UNITS							
Chlorobenzene	ppb	ND	ND	ND	ND	ND	ND	ND
Acetone	ppb	ND	ND	11.5	ND	ND	ND	ND
Toluene	ppb	ND	ND	92.4	ND	ND	ND	3.4
Ethyl benzene	ppb	ND	ND	90.5	ND	ND	ND	ND
Total xylenes	ppb	ND	ND	225	ND	ND	ND	ND
PESTICIDES								
Alpha-BHC	ppb	NA	ND	NA	0.7	0.98	0.64	0.3
Beta-BHC	ppb	NA	0.4	NA	0.4	0.30	0.53	0.4
Gamma-BHC	ppb	NA	0.2	NA	0.1	ND	0.12	ND
Heptachlor	ppb	NA	ND	NA	ND	ND	ND	ND
Endosulphan II	ppb	NA	ND	NA	ND	ND	ND	ND
Dieldrin	ppb	NA	ND	NA	0.1	ND	ND	ND
Endosulfan sulfate	ppb	NA	ND	NA	ND	ND	ND	ND
4,4'-DDD	ppb	NA	ND	NA	ND	ND	ND	ND
METALS								
Nickel	ppm	NA	NA	NA	0.11	NA	0.16	0.14
Zinc	ppm	NA	NA	NA	ND	NA	0.011	ND
TOTAL CYANIDE	ppm	NA	NA	NA	<0.01	NA	<0.01	<0.01
TPH BY IR	ppm	NA	NA	NA	2	NA	2	1
PETROLEUM ID								
Quantity	ppm	<1	NA	1	<1	5	4	<1
Type		ND	NA	GASOLINE	ND	ND	ND	ND

NOTES: 1-Listing includes only those compounds detected. ppb-parts per billion
2-Refer to Appendix H for laboratory data sheets. ppm-parts per million
NA-Not Analyzed
ND-Not Detected

TABLE VII *
EXTRAORDINARY COSTS FOR SOIL TREATMENT/DISPOSAL

Parcel 18 and Parcel 18B
Boston, Massachusetts

OPTION		ESTIMATED COST ** TOWER II	TOTAL SITE
I. AT GRADE SCHEME (Disposal on site)		–	–
II. BELOW GRADE SCHEME			
A. PRE-APPROVED DISPOSAL SITE		–	–
B. SOIL SEGREGATION: (LANDFILL)	urban fill/natural soils (92%) oil contamination (Special Mass.) (7%) waste oil contamination (out-of-state) (<1%)		
	TOTAL	$0.5M	$1.5M
C. SOIL SEGREGATION: (ASPHALT BATCHING)	urban fill/natural soils oil contamination waste oil contamination		
	TOTAL	$0.7M	$2M
D. ALL NON-CLAY SOILS DISPOSED IN SPECIAL MASS. LANDFILL (68%) (No segregation of 27 ft. layer.)		$4M	$10M
E. ALL NON-CLAY SOILS ASPHALT BATCHED (No segregation of 27 ft. layer.)		$6M	$15M
F. ALL NON-CLAY SOILS DISPOSED IN OUT-OF-STATE LANDFILL (No segregation of 27 ft. layer.)		$9M	$23M

* Assumes no impact from pesticides.
** Costs for treatment/disposal only.

TABLE VIII
ADVANTAGES AND DISADVANTAGES OF SOIL
TREATMENT/DISPOSAL OPTIONS

Parcel 18 and Parcel 18B
Boston, Massachusetts

OPTION	ADVANTAGES	DISADVANTAGES
I. At-Grade Scheme	o Would not hold up excavation progress o Least Costly. o No long-term liability associated with off-site disposal. o Disposal of soil with pesticides not an issue.	o With waiver, no DEQE concurrence that leaving soils place is acceptable. o Special vapor barrier may be required if ground floor is not used for parking.
IIA. Pre-Approved Disposal Site	o Would not impede site excavation. o No premium cost for off-site disposal.	o Appropriate site difficult to locate. o Extensive additional testing required (extra cost and time). o DEQE approval required - timeframe uncertain, outcome unpredictable; pesticide issue could result in DEQE disapproval; possible long-term liability associated with disposal site.
B. Segregation and Off-Site Disposal	o Reduces volume of soil requiring special handling and disposal.	o Would impede site excavation. o Pesticide level in "urban fill" a potential problem. o Volume of soil difficult to predict; some "dirty soil" might be missed. o Stockpiling and testing required prior to transport; double handling of material required. o One month's time (minimum) between excavation and transportation. o DEQE approval required for in-state disposal. o Long-term liability for landfill disposal. o Weather conditions will influence segregation process.

-continued-

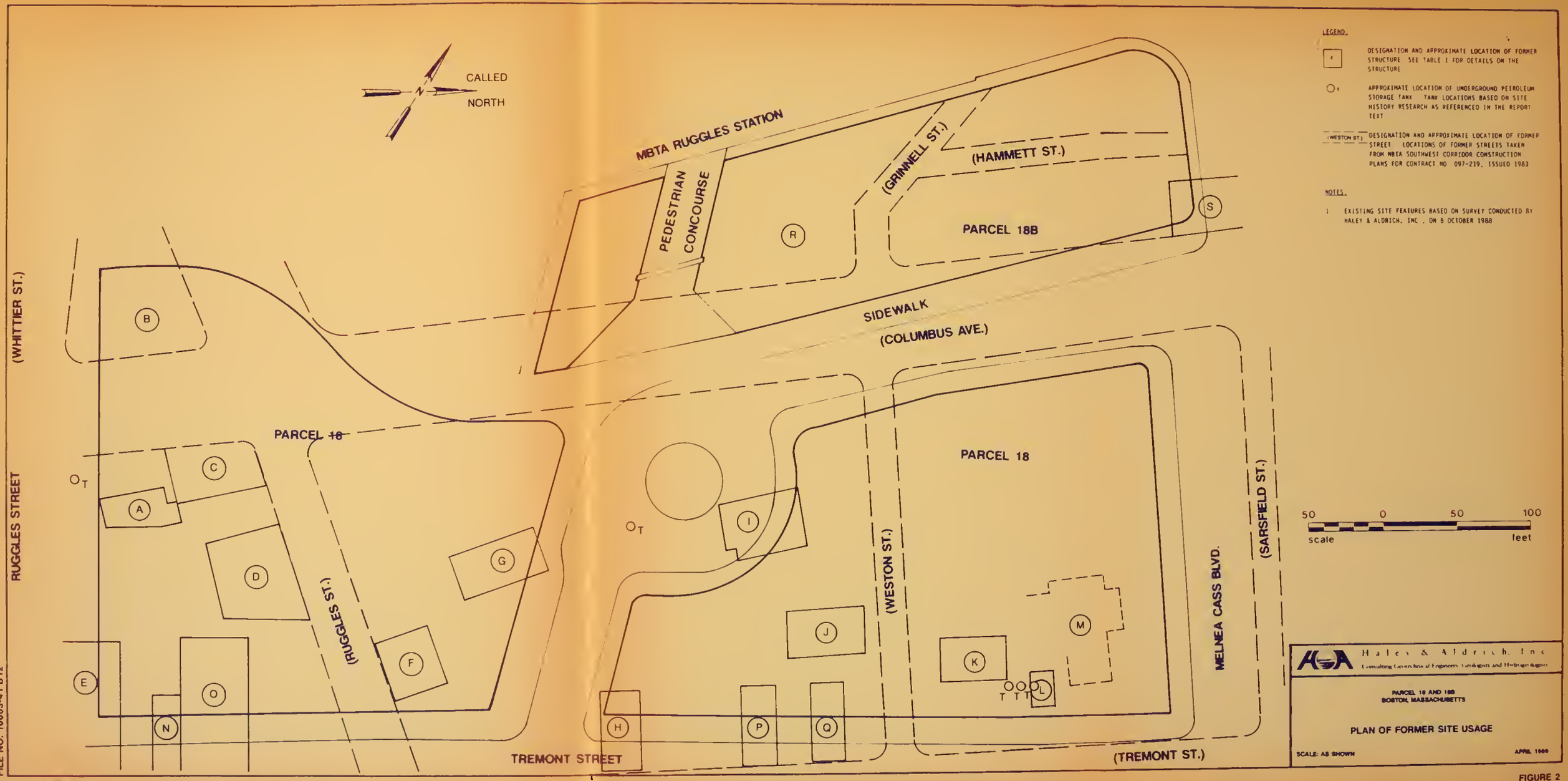
TABLE VIII
ADVANTAGES AND DISADVANTAGES OF SOIL
TREATMENT/DISPOSAL OPTIONS
(Continued)

Parcel 18 and Parcel 188
Boston, Massachusetts

OPTION	ADVANTAGES	DISADVANTAGES
C. Segregation and On-Site Asphalt Batching	o Reduces volume of soil requiring special handling and disposal. o No long-term liability for batched material.	o Would impede site excavation. o Pesticide level in "urban fill" a potential problem. o Volume of soil difficult to predict; some "dirty soil" might be missed. o Additional testing required to obtain DEQE recycling permit. o Stockpiling required prior to batching; double handling of material required. o Weather conditions will influence segregation process.
D. Off-Site Disposal in MA Special Landfill Without Segregation (All Non-Clay Soil)	o Segregation of soils not required.	o Stockpiling and testing required prior to transport. o One month's lag time between excavation and transport. o Additional testing required for DEQE approval. o Long-term liability for landfill disposal.
E. On-Site Batching Without Segregation	o Segregation of soils not required. o No long-term liability for batched material.	o Stockpiling required prior to batching. o Additional testing to obtain required DEQE recycling permit.
F. Off-Site Disposal in Out-of-State Landfill Without Segregation	o Segregation of soils not required. o Pesticide content not likely to be an issue.	o Expense prohibitive. o Stockpiling and testing required prior to landfill approval. o One month's lag time between excavation and transport. o Long-term liability associated with landfill disposal.

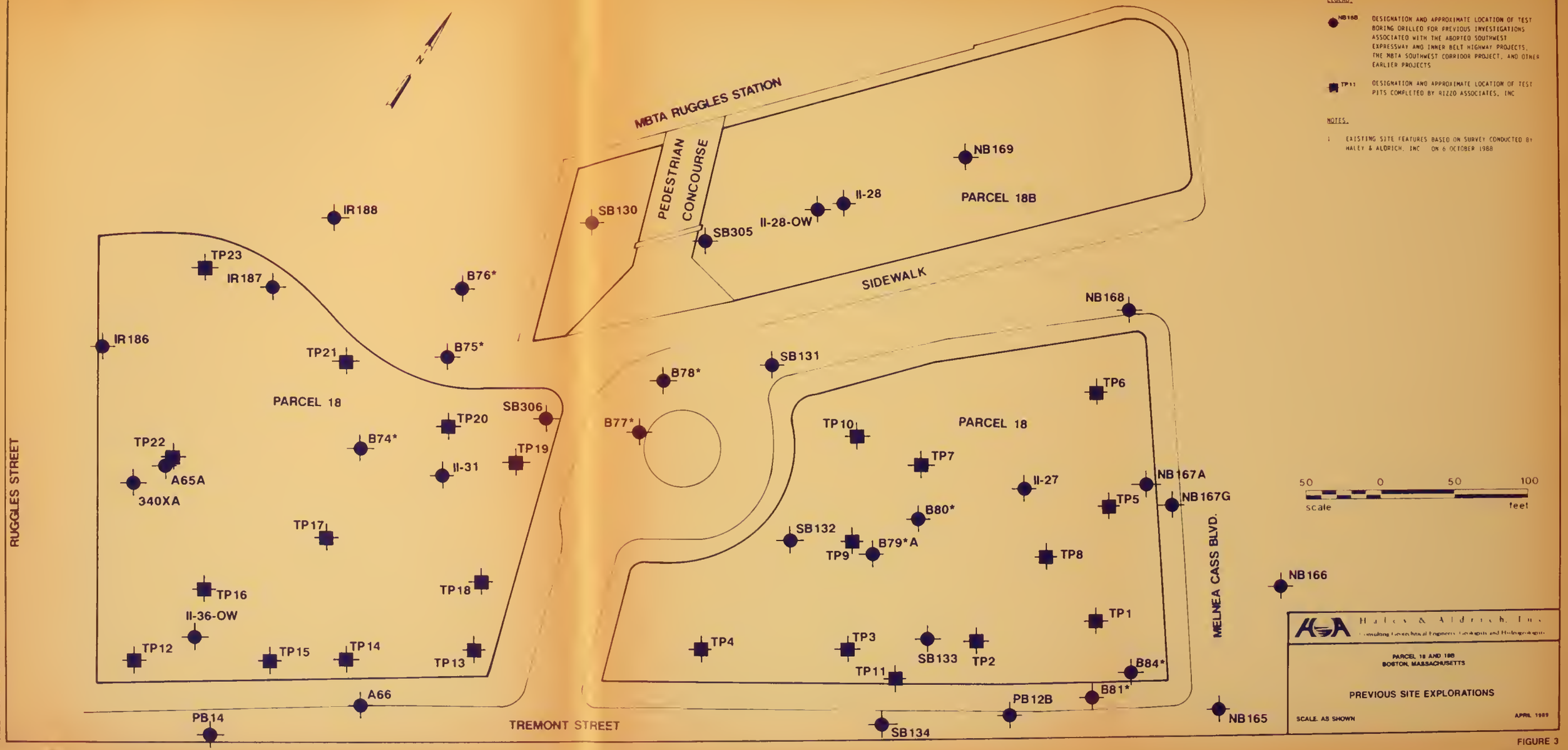
Figures

Charles River
RIVER Basin
Harvard Bridge
MIDDLESEX CO
SUFFOLK CO
Boston Univ Bridge
BOSTON UNIVERSITY Hosp
Beacon Hill
State House
Fire Sta
Frog Pond
Boston Common
Public Garden
Back Bay
Copley Square
Library
INTERCHANGE 21
INTERCHANGE 22
INTERCHANGE 23
INTERCHANGE 24
MASS PIKE
TOLL ROAD
TNPK
Fenway Park
Audubon Circle
Emmanuel College
Simmons College
Museum
NORTHEASTERN UNIVERSITY
Wentworth Institute
SITE
HARVARD MEDICAL SCH
Hospital
Madison Park
City Hospital
Roxbury Crossing
Eliot Cem
Orchard Park
Dearborn Sch
Mission Church Sch
Parker Hill
Playground
VA HOSPITAL
Jefferson Sch
Highland Park
Water Tank
Hale Sch
High Sch
Fire Sta
Roxbury
Washington Park
B O S T O N
Notre Dame Academy
Howe Sch
Harris Park
Winthrop Sch
Boston Tech High Sch
Fire Sta
Ellis Sch
Egleston Square
Roosevelt Jr High Sch
Brooks Sch
Fenwick Sch
Columbia Sq
Cem
Uphams Corner
Everett Square
Library
Dickerman
Mackey Sch
Roach Playground
Blackstone Square
Franklin Square
Sta
Playground
Hospital
Boston Univ
Bridge
Harvard
Bridge
Boston
Common
Public
Garden
Copley
Square
Fenway
Park
Audubon
Circle
Emmanuel
College
Simmons
College
Museum
Wentworth
Institute
Madison
Park
City
Hospital
Eliot
Cem
Orchard
Park
Dearborn
Sch
Mission
Church
Sch
Parker
Hill
Highland
Park
Water
Tank
Hale
Sch
Washington
Park
Howe
Sch
Harris
Park
Winthrop
Sch
Ellis
Sch
Egleston
Square
Roosevelt
Jr High
Sch
Brooks
Sch
Fenwick
Sch
Columbia
Sq
Cem
Uphams
Corner
Everett
Square
Library
Dickerman
Mackey
Sch
Roach
Playground
Blackstone
Square
Franklin
Square
Sta
Playground
Hospital
Fire Sta
High Sch
Playground
Fire Sta
Fire Sta
Fire Sta



FILE NO. 10003-41 B12

FIGURE 2



FILE NO. 10003-41 B13

FIGURE 3

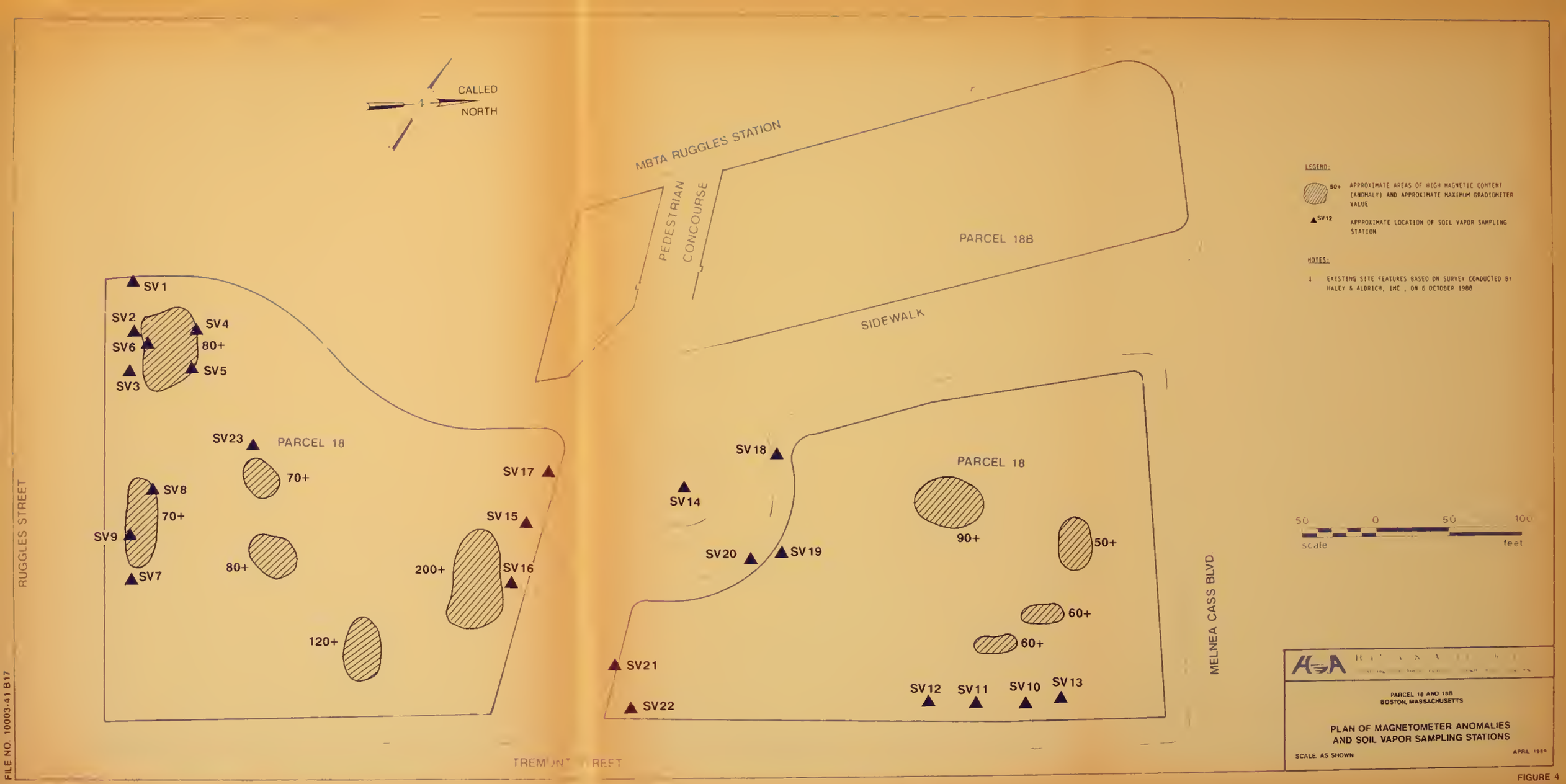
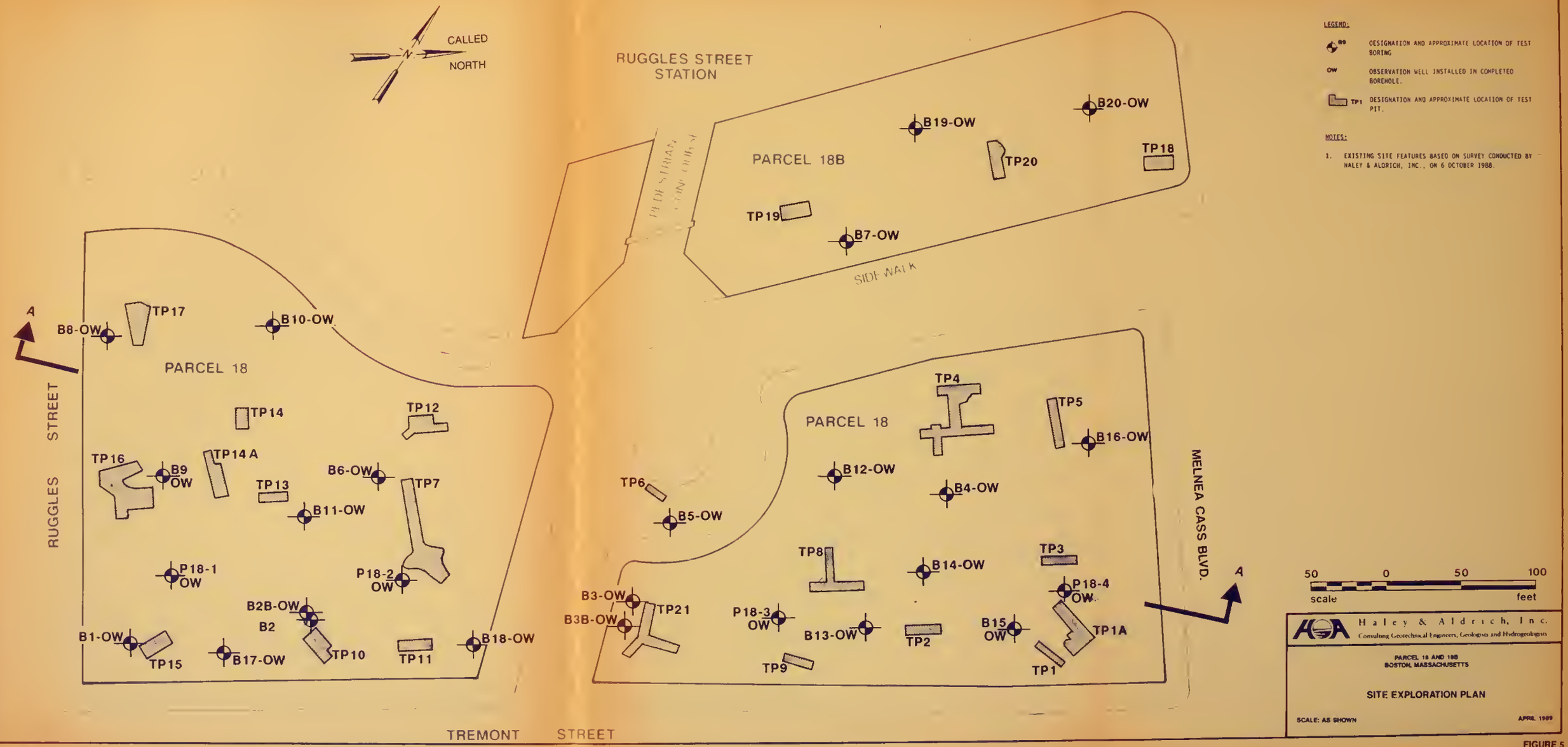

CALLED NORTH
MBTA RUGGLES STATION
PEDESTRIAN CONCOURSE
PARCEL 18B
SIDEWALK
SV1
SV2
SV4
SV6
80+
SV5
SV3
SV23
PARCEL 18
70+
SV17
SV8
70+
SV15
SV9
SV7
80+
200+
SV16
120+
SV18
SV14
PARCEL 18
90+
50+
SV20
SV19
60+
60+
SV21
SV12
SV11
SV10
SV13
SV22
RUGGLES STREET
MELNEA CASS BLVD
TREMONT STREET
LEGEND:
50+ APPROXIMATE AREAS OF HIGH MAGNETIC CONTENT (ANOMALY) AND APPROXIMATE MAXIMUM GRADIOMETER VALUE
SV12 APPROXIMATE LOCATION OF SOIL VAPOR SAMPLING STATION
NOTES:
1 EXISTING SITE FEATURES BASED ON SURVEY CONDUCTED BY HALEY & ALDRICH, INC., ON 6 OCTOBER 1988
50 0 50 100
scale feet
PARCEL 18 AND 18B
BOSTON, MASSACHUSETTS
PLAN OF MAGNETOMETER ANOMALIES AND SOIL VAPOR SAMPLING STATIONS
SCALE: AS SHOWN
APRIL 1989
FILE NO. 10003-41 B17

FIGURE 4



Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

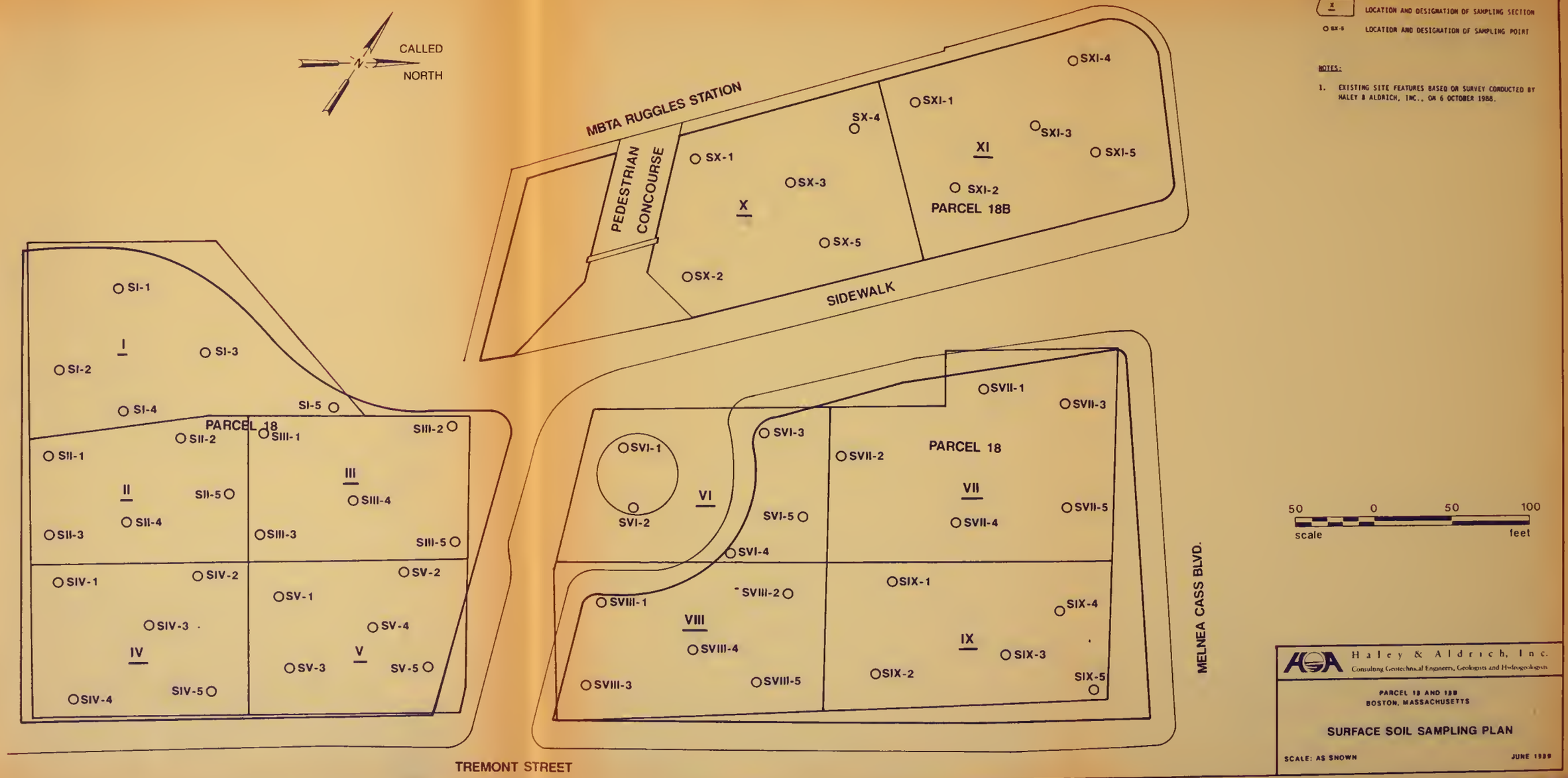
PARCEL 18 AND 18B
BOSTON, MASSACHUSETTS

SITE EXPLORATION PLAN

SCALE: AS SHOWN APRIL 1989

FILE NO. 10003-41 B14

FIGURE 5



LEGEND:

X — LOCATION AND DESIGNATION OF SAMPLING SECTION

SX-5 — LOCATION AND DESIGNATION OF SAMPLING POINT

NOTES:

1. EXISTING SITE FEATURES BASED ON SURVEY CONDUCTED BY HALEY & ALDRICH, INC., ON 6 OCTOBER 1988.

Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

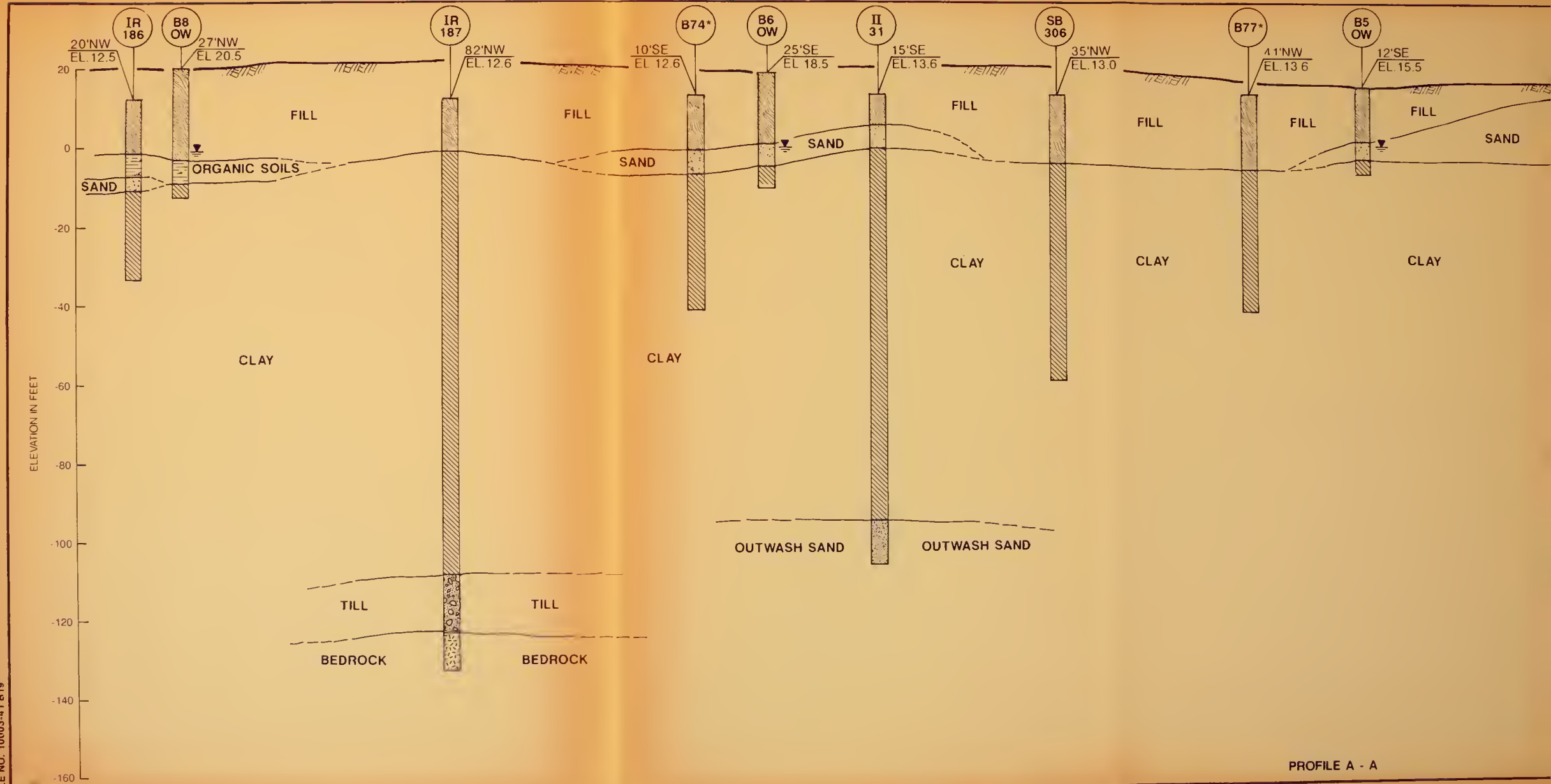
PARCEL 18 AND 18B
BOSTON, MASSACHUSETTS

SURFACE SOIL SAMPLING PLAN

SCALE: AS SHOWN JUNE 1989

FILE NO. 10003-41 B26

FIGURE 5B



PROFILE A - A

FILE NO. 10003-41 B19

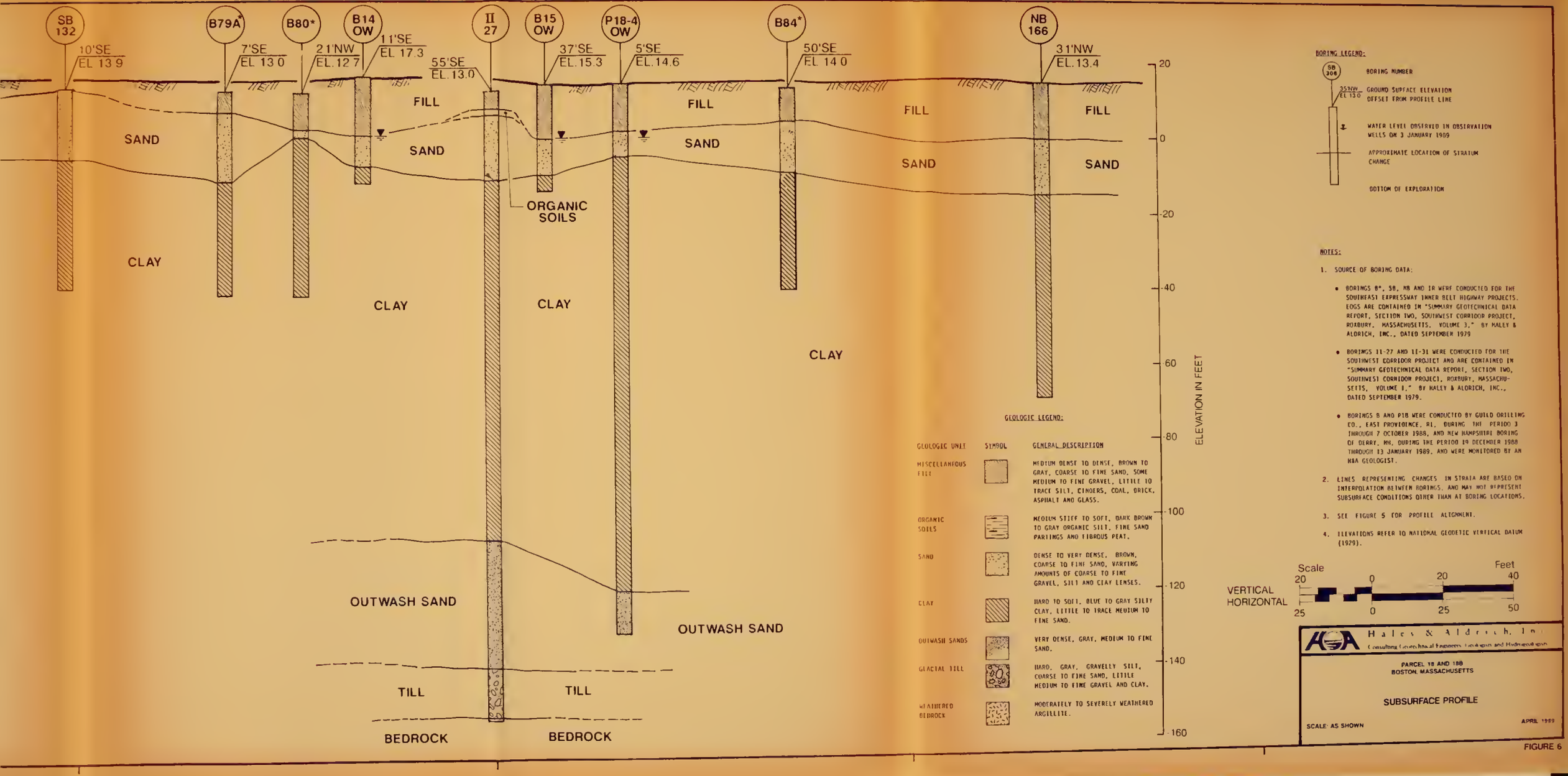
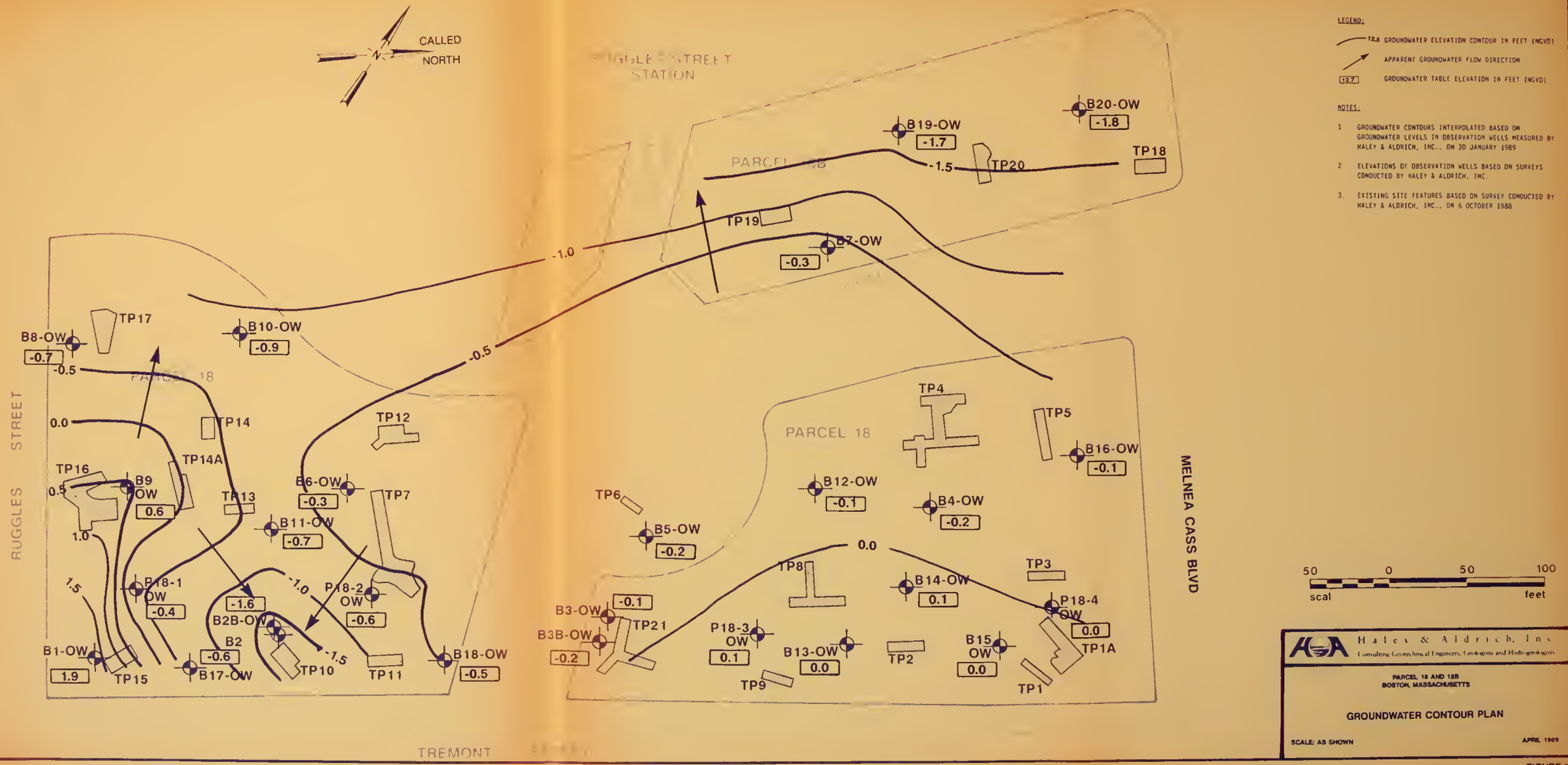

SB 132
10'SE
EL 13 9
B79A*
7'SE
EL 13 0
B80*
21'NW
EL.12 7
B14 OW
11'SE
EL 17.3
II 27
55'SE
EL.13.0
B15 OW
37'SE
EL.15.3
P18-4 OW
5'SE
EL.14.6
B84*
50'SE
EL 14 0
NB 166
31'NW
EL.13.4
FILL
SAND
CLAY
ORGANIC SOILS
OUTWASH SAND
TILL
BEDROCK
20
0
-20
-40
-60
-80
-100
-120
-140
-160
ELEVATION IN FEET
BORING LEGEND:
BORING NUMBER
GROUND SURFACE ELEVATION
OFFSET FROM PROFILE LINE
WATER LEVEL OBSERVED IN OBSERVATION WELLS ON 3 JANUARY 1989
APPROXIMATE LOCATION OF STRATUM CHANGE
BOTTOM OF EXPLORATION
GEOLOGIC LEGEND:
GEOLOGIC UNIT
SYMBOL
GENERAL DESCRIPTION
MISCELLANEOUS FILL
MEDIUM DENSE TO DENSE, BROWN TO GRAY, COARSE TO FINE SAND, SOME MEDIUM TO FINE GRAVEL, LITTLE TO TRACE SILT, CINDERS, COAL, BRICK, ASPHALT AND GLASS.
ORGANIC SOILS
MEDIUM STIFF TO SOFT, DARK BROWN TO GRAY ORGANIC SILT, FINE SAND PARTINGS AND FIBROUS PEAT.
SAND
DENSE TO VERY DENSE, BROWN, COARSE TO FINE SAND, VARYING AMOUNTS OF COARSE TO FINE GRAVEL, SILT AND CLAY LENSES.
CLAY
HARD TO SOFT, BLUE TO GRAY SILTY CLAY, LITTLE TO TRACE MEDIUM TO FINE SAND.
OUTWASH SANDS
VERY DENSE, GRAY, MEDIUM TO FINE SAND.
GLACIAL TILL
HARD, GRAY, GRAVELLY SILT, COARSE TO FINE SAND, LITTLE MEDIUM TO FINE GRAVEL AND CLAY.
WEATHERED BEDROCK
MODERATELY TO SEVERELY WEATHERED ARGILLITE.
NOTES:
1. SOURCE OF BORING DATA:
• BORINGS B*, SB, NB AND IR WERE CONDUCTED FOR THE SOUTHEAST EXPRESSWAY INNER BELT HIGHWAY PROJECTS. LOGS ARE CONTAINED IN "SUMMARY GEOTECHNICAL DATA REPORT, SECTION TWO, SOUTHWEST CORRIDOR PROJECT, ROXBURY, MASSACHUSETTS, VOLUME 3," BY HALEY & ALDRICH, INC., DATED SEPTEMBER 1979
• BORINGS II-27 AND II-31 WERE CONDUCTED FOR THE SOUTHWEST CORRIDOR PROJECT AND ARE CONTAINED IN "SUMMARY GEOTECHNICAL DATA REPORT, SECTION TWO, SOUTHWEST CORRIDOR PROJECT, ROXBURY, MASSACHUSETTS, VOLUME 1," BY HALEY & ALDRICH, INC., DATED SEPTEMBER 1979.
• BORINGS B AND P18 WERE CONDUCTED BY GUILD DRILLING CO., EAST PROVIDENCE, RI, DURING THE PERIOD 3 THROUGH 7 OCTOBER 1988, AND NEW HAMPSHIRE BORING OF DERRY, NH, DURING THE PERIOD 19 DECEMBER 1988 THROUGH 13 JANUARY 1989, AND WERE MONITORED BY AN H&A GEOLOGIST.
2. LINES REPRESENTING CHANGES IN STRATA ARE BASED ON INTERPOLATION BETWEEN BORINGS, AND MAY NOT REPRESENT SUBSURFACE CONDITIONS OTHER THAN AT BORING LOCATIONS.
3. SEE FIGURE 5 FOR PROFILE ALIGNMENT.
4. ELEVATIONS REFER TO NATIONAL GEODETIC VERTICAL DATUM (1929).
Scale
Feet
VERTICAL
HORIZONTAL
20 0 20 40
25 0 25 50
Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists
PARCEL 18 AND 18B
BOSTON, MASSACHUSETTS
SUBSURFACE PROFILE
SCALE: AS SHOWN
APRIL 1989

FIGURE 6



LEGEND:

- 12.5 GROUNDWATER ELEVATION CONTOUR IN FEET (NGVD)
- APPARENT GROUNDWATER FLOW DIRECTION
- 12.7 GROUNDWATER TABLE ELEVATION IN FEET (NGVD)

NOTES:

1. GROUNDWATER CONTOURS INTERPOLATED BASED ON GROUNDWATER LEVELS IN OBSERVATION WELLS MEASURED BY HALEY & ALDRICH, INC., ON 30 JANUARY 1989
2. ELEVATIONS OF OBSERVATION WELLS BASED ON SURVEYS CONDUCTED BY HALEY & ALDRICH, INC.
3. EXISTING SITE FEATURES BASED ON SURVEY CONDUCTED BY HALEY & ALDRICH, INC., ON 6 OCTOBER 1988

Haley & Aldrich, Inc
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

PARCEL 18 AND 18B
BOSTON, MASSACHUSETTS

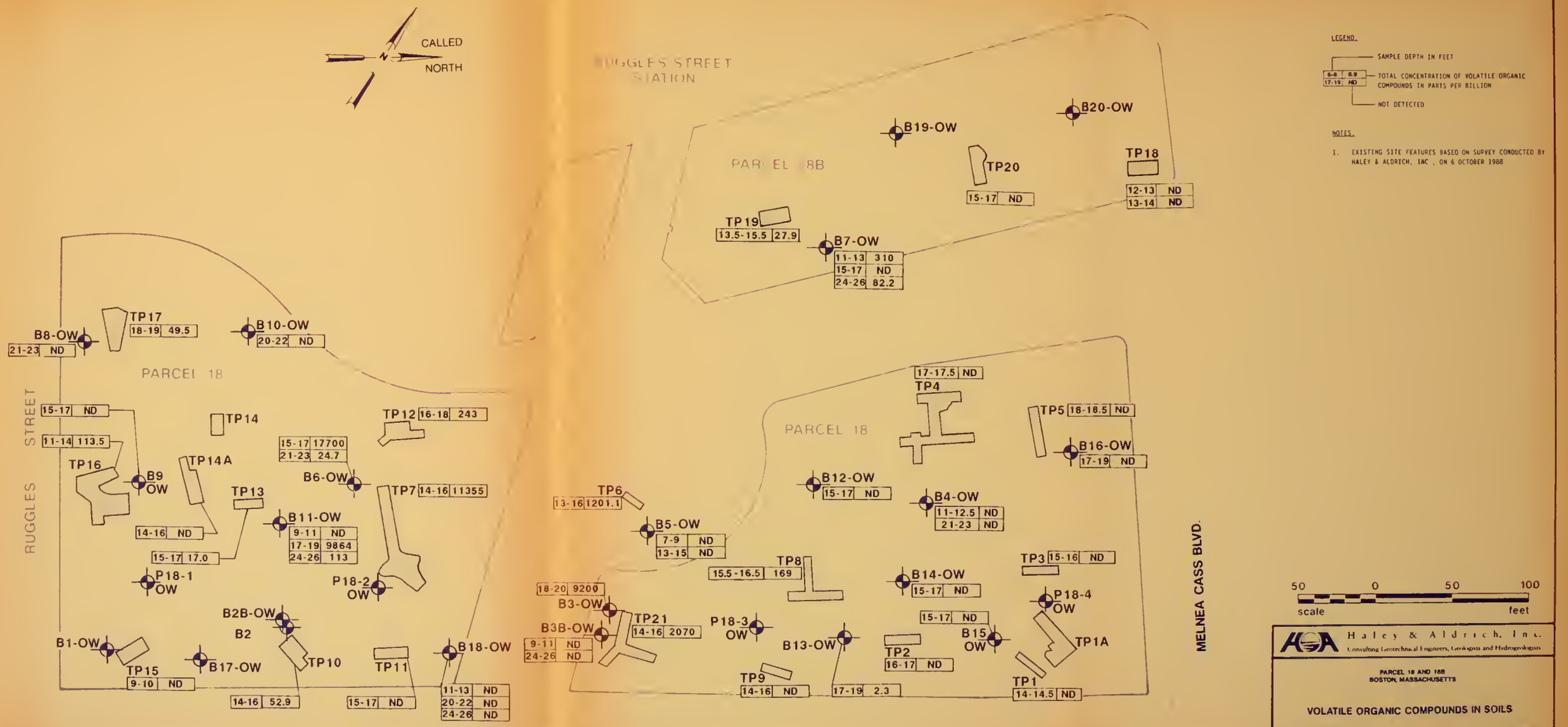
GROUNDWATER CONTOUR PLAN

SCALE: AS SHOWN

APRIL 1989

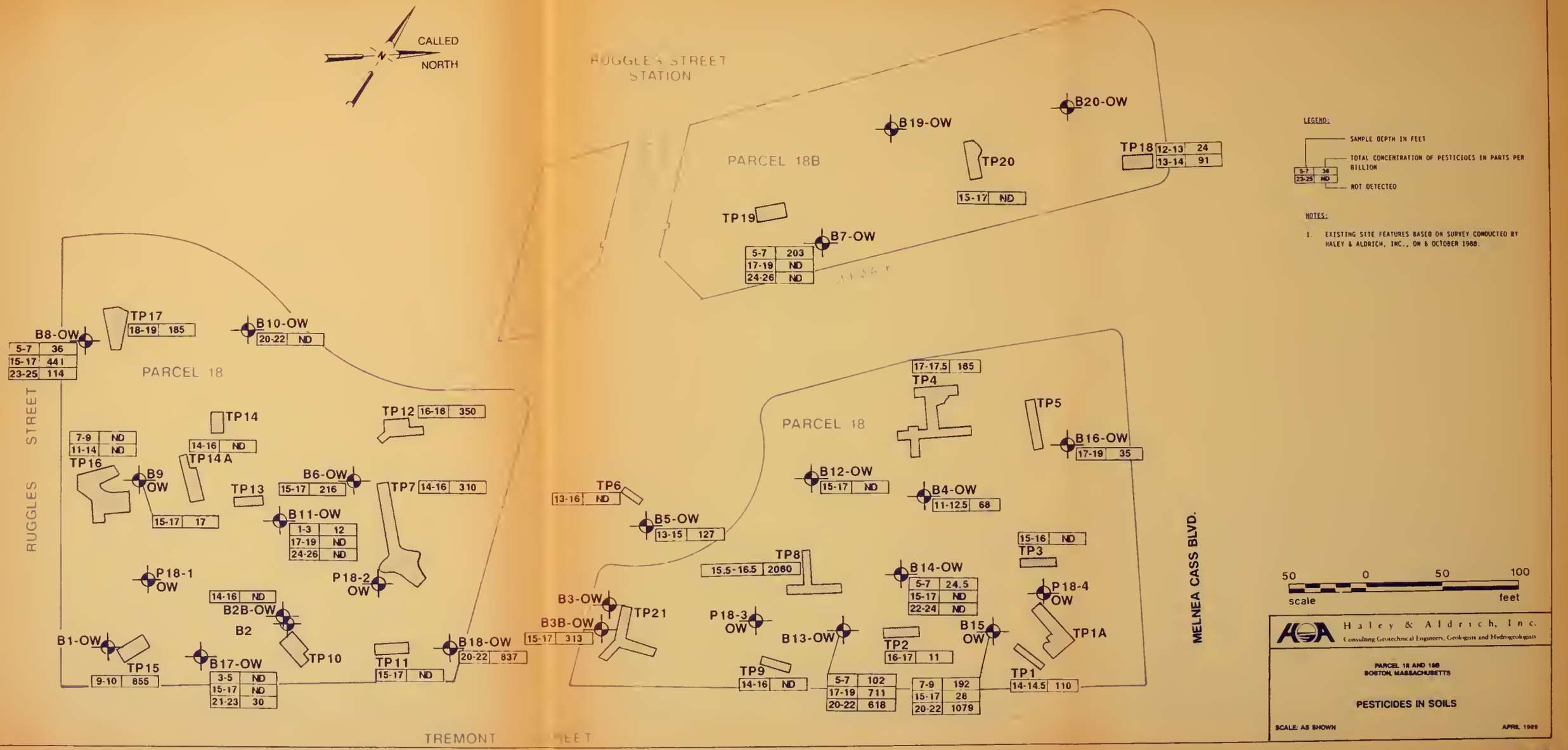
FILE NO. 10003-41 B16

FIGURE 7



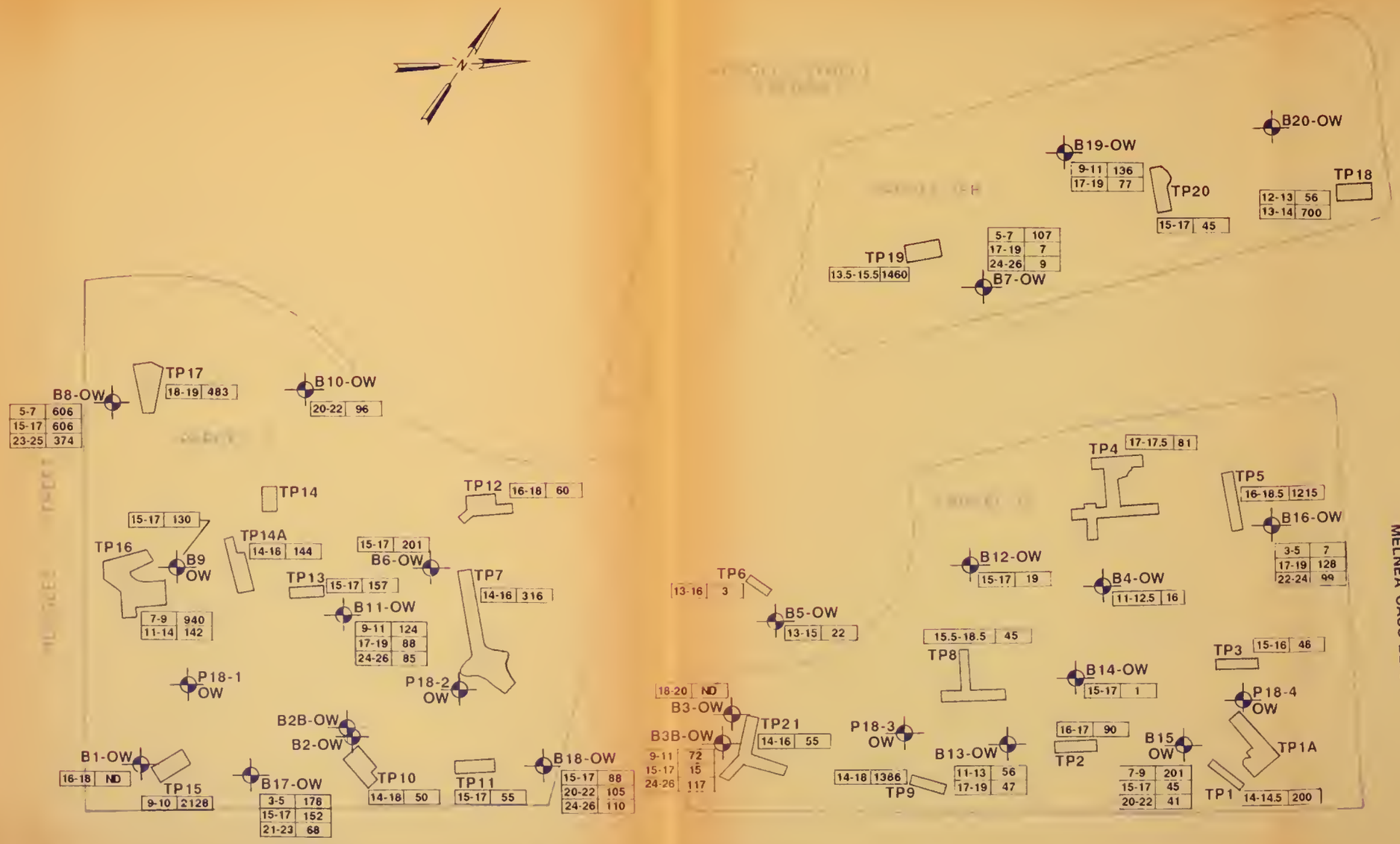
FILE NO. 10003-41 B18

FIGURE 8



FILE NO. 10003-41 B20

FIGURE 9



LEGEND:

11 14 1135 — SAMPLE DEPTH IN FEET / TOTAL CONCENTRATION OF PETROLEUM HYDROCARBONS IN PARTS PER MILLION

ND — NOT DETECTED

NOTES:

1 EXISTING SITE FEATURES BASED ON SURVEY CONDUCTED BY HALEY & ALDRICH, INC., ON 6 OCTOBER 1988

50 0 50 100
scale feet

Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

PARCEL 18 AND 19B
BOSTON, MASSACHUSETTS

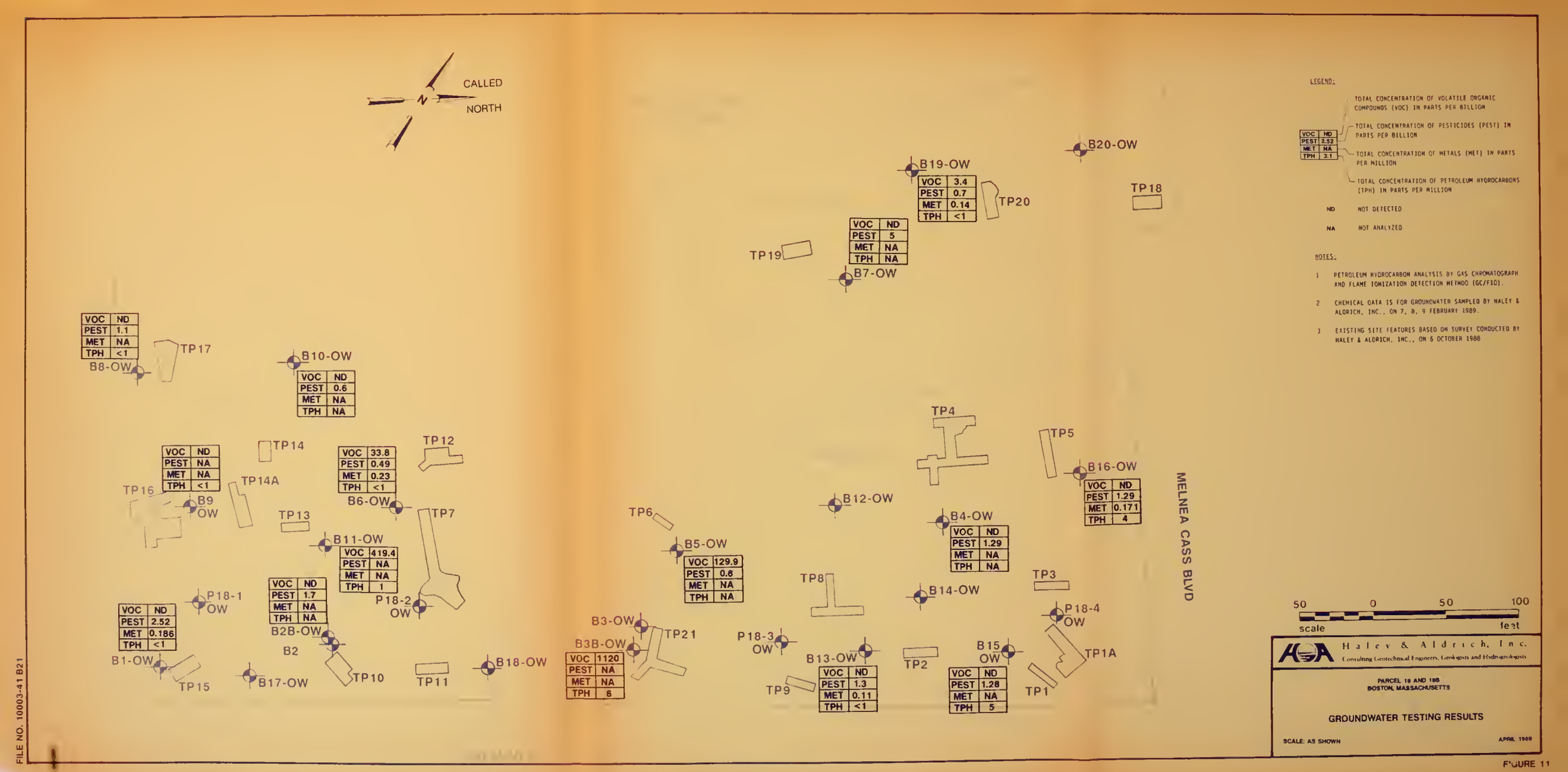
PETROLEUM HYDROCARBONS IN SOILS

SCALE AS SHOWN

APRIL 1989

FIGURE 10

FILE NO. 10003-41 B19



LEGEND:

VOC ND
PEST 2.52
MET NA
TPH 3.1

- TOTAL CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS (VOC) IN PARTS PER BILLION
- TOTAL CONCENTRATION OF PESTICIDES (PEST) IN PARTS PER BILLION
- TOTAL CONCENTRATION OF METALS (MET) IN PARTS PER MILLION
- TOTAL CONCENTRATION OF PETROLEUM HYDROCARBONS (TPH) IN PARTS PER MILLION

ND NOT DETECTED

NA NOT ANALYZED

NOTES:

1 PETROLEUM HYDROCARBON ANALYSIS BY GAS CHROMATOGRAPH AND FLAME IONIZATION DETECTION METHOD (GC/FID).

2 CHEMICAL DATA IS FOR GROUNDWATER SAMPLED BY HALEY & ALDRICH, INC., ON 7, 8, 9 FEBRUARY 1989.

3 EXISTING SITE FEATURES BASED ON SURVEY CONDUCTED BY HALEY & ALDRICH, INC., ON 6 OCTOBER 1988

50 0 50 100
scale feet

Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

PARCEL 18 AND 19B
BOSTON, MASSACHUSETTS

GROUNDWATER TESTING RESULTS

SCALE: AS SHOWN

APRIL 1989

FILE NO. 10003-41 B21

FIGURE 11

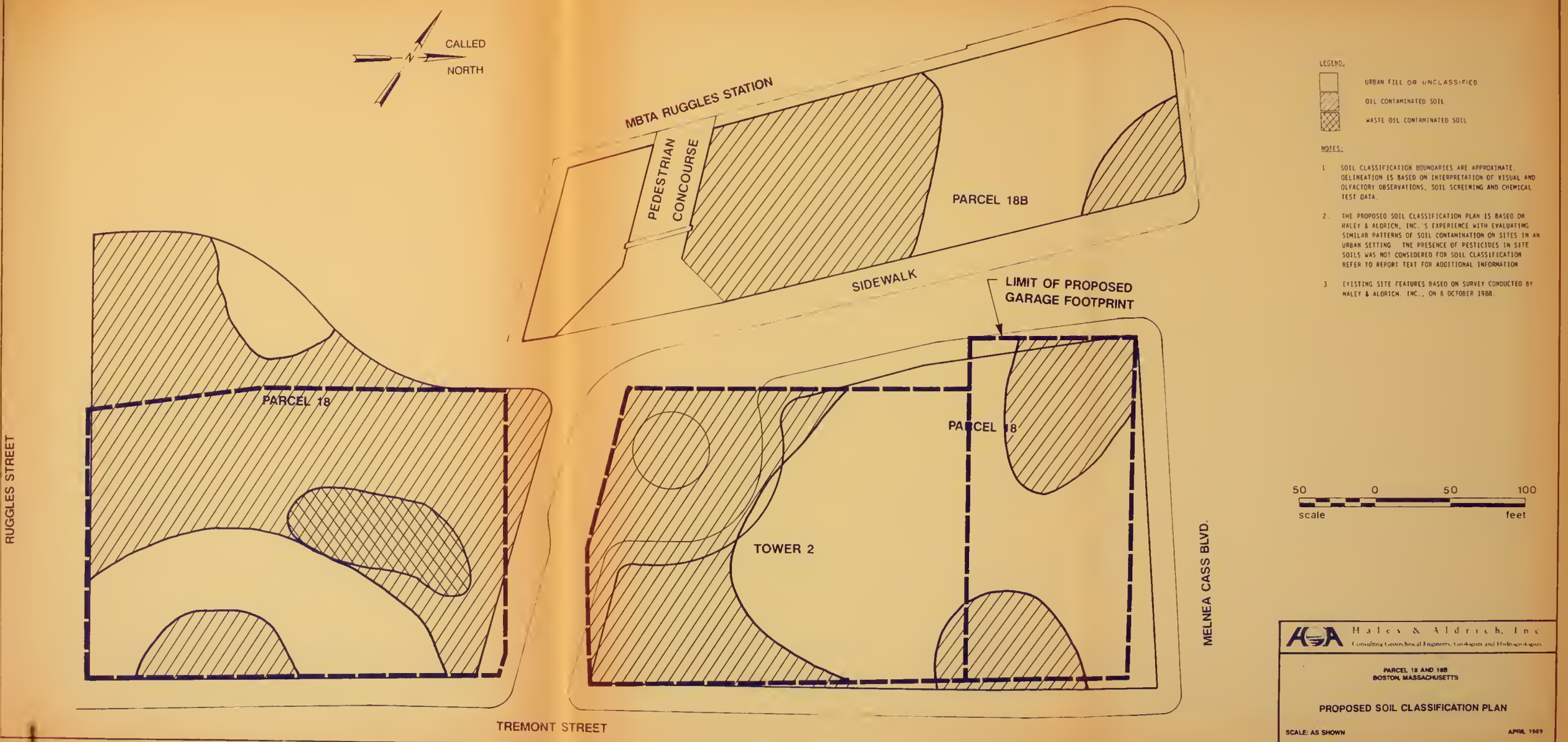

CALLED
NORTH
MBTA RUGGLES STATION
PEDESTRIAN CONCOURSE
PARCEL 18B
SIDEWALK
LIMIT OF PROPOSED GARAGE FOOTPRINT
PARCEL 18
PARCEL 18
TOWER 2
RUGGLES STREET
TREMONT STREET
MELNEA CASS BLVD.
LEGEND:
URBAN FILL OR UNCLASSIFIED
OIL CONTAMINATED SOIL
WASTE OIL CONTAMINATED SOIL
NOTES:
1 SOIL CLASSIFICATION BOUNDARIES ARE APPROXIMATE. DELINEATION IS BASED ON INTERPRETATION OF VISUAL AND OLFACTORY OBSERVATIONS, SOIL SCREENING AND CHEMICAL TEST DATA.
2. THE PROPOSED SOIL CLASSIFICATION PLAN IS BASED ON HALEY & ALDRICH, INC.'S EXPERIENCE WITH EVALUATING SIMILAR PATTERNS OF SOIL CONTAMINATION ON SITES IN AN URBAN SETTING. THE PRESENCE OF PESTICIDES IN SITE SOILS WAS NOT CONSIDERED FOR SOIL CLASSIFICATION. REFER TO REPORT TEXT FOR ADDITIONAL INFORMATION.
3 EXISTING SITE FEATURES BASED ON SURVEY CONDUCTED BY HALEY & ALDRICH, INC., ON 6 OCTOBER 1988.
50 0 50 100
scale feet
Haley & Aldrich, Inc
Consulting Geotechnical Engineers, Geologists and Hydrogeologists
PARCEL 18 AND 18B
BOSTON, MASSACHUSETTS
PROPOSED SOIL CLASSIFICATION PLAN
SCALE: AS SHOWN
APRIL 1989

FIGURE 12

Appendix A

APPENDIX A

References

REFERENCES

1. Haley & Aldrich, Inc., "Work Plan for Phase Two Oil and Hazardous Material Site Evaluation, Parcel 18 and Parcel 18B, Boston, Massachusetts", May 1989.

2. Haley & Aldrich, Inc., "Preliminary Oil and Hazardous Material Site Evaluation, Parcel 18 Development, Boston, Massachusetts," 26 September 1988.

3. Demolition and Storage Plan of the Southwest Corridor Project Contract No. 097-204, prepared by Frederic R. Harris, Inc., of Boston, Massachusetts. Obtained from the Massachusetts Bay Transportation Authority, dated 20 July 1979, to a scale of 1 in. = 20 ft.

4. Polk's Boston City Directory, Meredith & Grew, Publishers, 1960, 1965, 1970.

5. Polk's Boston City Directory, Meredith & Grew, Publishers, 1960, 1965, 1970.

6. Sanborn Map Co., "Insurance Maps of Boston" on microfilm: Reel 5, volume 3, 1897, to a scale of 1 in. = 50 ft. Reel 7, Volume 2, 1914, to a scale of 1 in. = 50 ft; Reel 7 Volumes 28 and 3, 1908-1938, to a scale of 1 in. = 50 ft.; Reel 9 Volume 25, 1929 updated through February 1951, to a scale of 1 in. = 50 ft.; Reel 9, Volume 3, 1929, updated through March 1950, to a scale of 1 in. = 50 ft.; Volume 3E revised 1979, to a scale of 1 in. = 100 ft.

7. Haley & Aldrich, Inc., file review at the Boston Fire Prevention Bureau, Boston, Massachusetts, on 20 October 1988.

8. Haley & Aldrich, Inc., telephone communication with Patrick Hurley of Dodge Chemical Co., 18 October 1988.

9. Articles of Organization pertaining to the forming of Mercury Distributers, Inc., 1139 Tremont Street, Boston, MA, dated 11 September 1947.

10. Haley & Aldrich, Inc., file review at the Massachusetts Department of Environmental Protection, Northeast Regional Office, Woburn, Massachusetts, on 2 September 1988.

REFERENCES
(Continued)

11. Haley & Aldrich, Inc., "Geotechnical Interpretive Report, Section Two, Southwest Corridor Project, Roxbury, Mass." for PRC Harris, Inc., Revised 1983.

12. Haley & Aldrich, Inc., "Geotechnical Interpretive Report, Section One, Southwest Corridor Project, Boston, Mass." for Fay, Spofford & Thorndike, Inc., 1980.

13. R. A. Freeze and J. A. Cherry, "Groundwater", Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1979.

14. D. R. Hampton and P. G. Miller, "Laboratory Investigation of the Relationship Between Actual and Apparent Product Thickness in Sands", Proceedings of Petroleum Hydrocarbons and Organic Chemicals in Groundwater: Prevention, Detection and Restoration, Volume I, National Water Well Association, November 1988.

15. H. T. Shacklette and J. G. Boerngen, "Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States", United States Geological Survey Professional Paper 1270, 1984.

16. E. K. Nyer and G. J. Skladany, "Relating the Physical and Chemical Properties of Petroleum Hydrocarbons to Soil and Aquifer Remediation", Groundwater Monitoring Review, Winter 1989.

17. American Water Works Association, "Mainstream", Vol. 32, No. 7, July 1988.

18. "Environmental Reporter", National Interim Primary and Secondary Drinking Water Regulations, 1 August 1986.

A26

Appendix B

APPENDIX B

Summary of the Massachusetts Contingency Plan

A SUMMARY OF THE MASSACHUSETTS CONTINGENCY PLAN

prepared by
Haley & Aldrich, Inc.
Cambridge, Massachusetts
(494-1606)

The purpose of this document is to summarize briefly the provisions of the Massachusetts Contingency Plan (MCP) pursuant to Chapter 21E of the Massachusetts General Laws and to provide guidance relative to some of the issues raised by the MCP and its application to sites at which oil or hazardous materials have been encountered. All sites which fall under Chapter 21E (i.e. have had a release or present a threat of a release of oil or hazardous material) must comply with the regulations set forth in the MCP. The effective date of the MCP was 3 October 1988.

Prior to implementation of the MCP, the site owner's consultant would prepare a site assessment report suitable for submission to the DEP by the owner or the consultant. For a site which was not significantly contaminated, the owner, consultant and the DEP would communicate directly with one another and would agree on a course of action based on the report. The owner and the consultant would then prepare a remediation plan for the site and implement it after informal review by the DEP, without unreasonable delays. This past practice is not permitted under the MCP and, unless a waiver of approvals is obtained, DEP oversight during study and clean up of a site is required once the initial site investigation (Phase I) is completed.

The MCP process requires that a site advance through four stages, following a Preliminary Assessment, namely: Limited Site Investigation (Phase I), Comprehensive Site Assessment (Phase II), Development of Remedial Response Alternatives (Phase III), Implementation of the Approved Remedial Response Alternative (Phase IV).

In order for a site to start through the MCP process a referral or formal notification to the DEP must occur concerning the existence of a possible disposal site. Listing of a site by DEP is the initial step in the MCP process. A brief summary of the various phases of work under the MCP are presented below.

Preliminary Assessment

A preliminary assessment is an initial evaluation which involves identification of available information on site characteristics, site history, and regulatory status and includes a site visit. Its purpose is to determine whether or not a location is a disposal site subject to the MCP as well as to evaluate the need for emergency action. The result of this phase of study is the completion of a Preliminary Assessment form which must be filed with the DEP. Notification to the DEP by the property owner of a release or threat of release may precede or accompany the Preliminary Assessment form. Upon notification the agency determines whether the location will immediately be included on their "List of Sites to be Investigated" or be kept in reserve temporarily.

Phase I - Limited Site Investigation

A Phase I study requires compiling additional information concerning the history of the site and conditions at the site. An initial program of sampling and screening is conducted to assist in evaluation of the nature and extent of contamination at the site. The Limited Site Investigation Report is used by DEP to decide whether or not the location is a disposal site and if so, whether adequate information is available to classify the disposal site as a priority or non-priority site. Priority disposal sites are those that constitute a substantial hazard to health, safety, public welfare or the environment and are acted upon more quickly than non-priority sites. Under the MCP, priority disposal sites must be cleaned up within four years of site listing. Clean up of a non-priority site must take place within a seven year time frame.

At the conclusion of Phase I, certain public involvement activities must take place. The nature of the public involvement activities depends on the classification of the site. For non-priority sites, public involvement is usually limited to issuance of a legal notice and a press release concerning the status of a site and information about how the public can get involved. Copies of the Notice and press release must be provided to local public health officials and the Chief Municipal Officer at least three days prior to publication. For priority sites, public involvement activities may include preparation of a public involvement plan and compliance with the Massachusetts Environmental Policy Act (MEPA) relative to publishing a notice in the Environmental Monitor.

Waiver of Approvals

Once a site is "listed", classified and determined to be a non-priority site, a waiver of approvals may be applied for. Unless they have already been submitted, the Preliminary Assessment form and the Phase I report must be sent to the DEP office in Boston along with a Waiver Application Form. A $1200 fee for processing of the waiver application is required. The waiver allows study and clean up of a site to proceed without DEP review and approval of reports, etc. during the remainder of the MCP process. Eliminating the need for interaction with DEP can substantially accelerate the MCP compliance process. However, a recipient of a waiver must still follow the MCP and submit all of the required reports, apply for permits and conduct public involvement activities stipulated by the MCP. Through the process of random audits of documents submitted for "waivered" sites the DEP may review all reports submitted and remedial actions taken for a particular site. However, the owner of a "waivered site" should understand that site study and clean up without DEP oversight proceeds "at risk" to the extent that no form of final review or approval is available from DEP. In addition the owner should understand that the response action activities are subject to DEP audit at any time. During such an audit deficiencies may be noted by DEP in the reports submitted or response actions taken, and further requirements for study or site clean up may be imposed on the owner.

Phase II - Comprehensive Site Assessment

The purpose of a Phase II Study is to fully investigate the site in order to define the source, extent and characteristics of on-site contamination. The Phase II study supplements information compiled during Phase I. Preparation of a Work Plan for this phase is required, including a Schedule, a Sampling Plan and a Health and Safety Plan. A Risk Assessment is also required in Phase II to characterize the risk of harm to health, safety, public welfare and the environment. The chief municipal officer and public health officials must be notified of the Phase II study results and made aware of how to obtain a copy of this Phase II report. For a Public Involvement Priority site (PIP site) the Public Involvement Plan must be followed. For a waivered site, DEP review and approval of the Phase II work plan and report would not be required; however these documents would have to be submitted to DEP upon completion.

Phase III - Remedial Action Alternative Screening and Selection

Phase III includes the following activities:

- Identification of remedial response alternatives; (i.e. different techniques for cleaning up the site).
- Evaluation of remedial response alternatives; (i.e. consideration of various options for site clean up including both temporary and permanent solutions).
- Preparation of a Final Remedial Response Plan. (FRRP)

The objective of Phase III work is to select the remedial response alternative which is most appropriate for a particular site. Public involvement activities during this phase are the same as during Phase II. Additional public involvement associated with MEPA may be required due to a need for a permit or if estimated remediation costs are in excess of $1 million.

The DEP will either approve or reject the proposed FRRP based on information provided in the Phase III report. If a waiver has been approved for a site, DEP review and approval of these documents would not occur prior to implementation.

Phase IV - Implementation of Approved Remedial Response Alternative

During Phase IV; design, construction and implementation of the remedial response alternative selected and developed during Phase III are carried out as part of the Remedial Response Implementation Plan (RRIP). Permits required to implement the FRRP are obtained. Local officials and the community are advised of the RRIP in the case of non-priority sites. For priority sites the public involvement plan is followed and for some sites MEPA compliance is required. Once the response actions have been completed, a final inspection report is submitted to the DEP. The report describes clean up activities such that DEP can determine if the work was completed in compliance with the RRIP. For sites without waivers DEP approval of the final inspection report is provided at the end of Phase IV.

Phase V - Post-Closure Monitoring

Phase V activities have not been fully addressed by the MCP to date. This phase of work relates to operation and maintenance of the implemented remediation system including periodic monitoring of site conditions to evaluate effectiveness of the response action.

For a site where a waiver of DEP approvals has not been granted, agency approval is required for the Phase II work scope and reports or plans associated with each phase of work after Phase I. If a waiver of approvals is obtained, the phases of work outlined in the MCP may proceed without DEP reviews and approvals. However, "waivered" sites do not receive final approval from DEP. For such sites, the DEP will only acknowledge receipt from the applicant of the required MCP documents and the decision concerning which approach to use with respect to the MCP will depend on the specific characteristics of a particular site. Adoption of a strategy for regulatory interaction should occur with the full knowledge and concurrence of all parties including the owner/buyer/developer, their attorneys and consultants.

17 October 1989

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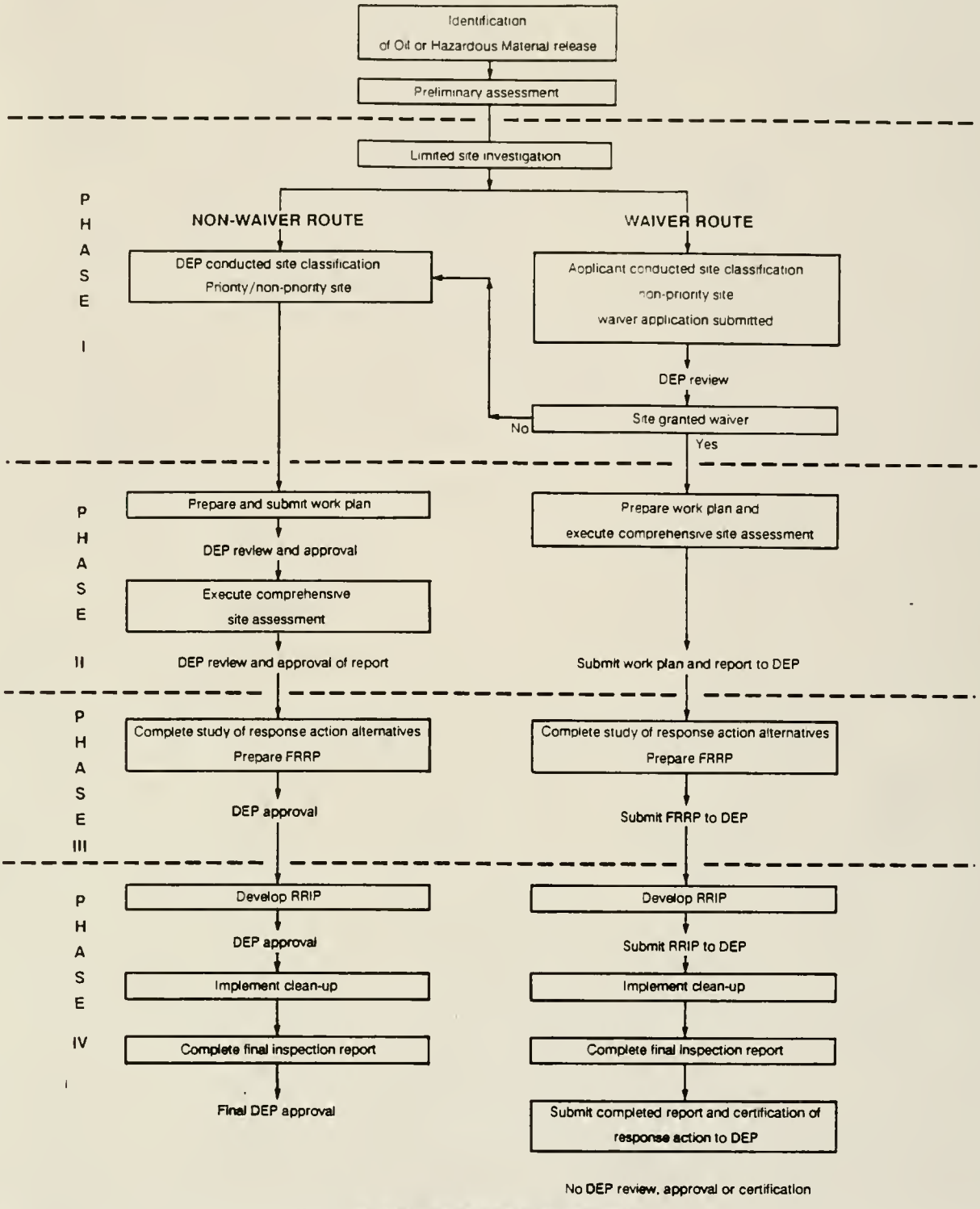
MASSACHUSETTS CONTINGENCY PLAN PROCESS


Identification of Oil or Hazardous Material release
Preliminary assessment
Limited site investigation
PHASE I
NON-WAIVER ROUTE
WAIVER ROUTE
DEP conducted site classification Priority/non-priority site
Applicant conducted site classification non-priority site waiver application submitted
DEP review
Site granted waiver
No
Yes
PHASE II
Prepare and submit work plan
DEP review and approval
Execute comprehensive site assessment
DEP review and approval of report
Prepare work plan and execute comprehensive site assessment
Submit work plan and report to DEP
PHASE III
Complete study of response action alternatives Prepare FRRP
DEP approval
Complete study of response action alternatives Prepare FRRP
Submit FRRP to DEP
PHASE IV
Develop RRIP
DEP approval
Implement clean-up
Complete final inspection report
Final DEP approval
Develop RRIP
Submit RRIP to DEP
Implement clean-up
Complete final inspection report
Submit completed report and certification of response action to DEP
No DEP review, approval or certification
(public involvement activities take place during all phases)

DEP - Department of Environmental Protection
FRRP - Final Remedial Response Plan
MCP - Massachusetts Contingency Plan
RRIP - Remedial Response Implementation Plan

Haley & Aldrich, Inc.
Consulting Geotechnical Engineers, Geologists and Hydrogeologists

Appendix C

APPENDIX C

Test Pit Reports

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP1

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +20

EXPLORATION DATE 28 NOV 88

H&A REP B. Miller, T. Coffin

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass mat and brown sandy SILT (Topsoil)	
3				Light gray to tan medium SAND, intermixed with brick, wood, coal, fine to coarse gravel, asphalt -FILL-	
	4.4			Coal, wood fragments -FILL-	
	5.5				
6				Light gray medium SAND, intermixed with brick fragments, wood, coal, fine to coarse gravel -FILL-	
9					
12	12.0			Tan/gray gravelly medium SAND, frequent cobbles, and rock fragments -FILL-	Distinctive gas/ petroleum odor
		S1	14.0-14.5		Sheen on water
15				Bottom of Exploration at 14.5 ft.	HNU Data Background = 1.5 ppm S1 = 50 ppm

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
28 NOV 88	1.0	14.0

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 23 FEET WIDTH 3.4 FEET

BOULDERS

8" TO 18" DIAMETER - (number) - VOLUME - (cu ft)

OVER 18" DIAMETER - (number) - VOLUME - (cu ft)

SUMMARY

DEPTH 14.5 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 14.0 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP1A

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +20

EXPLORATION DATE 28 NOV 88

H&A REP B. Miller, T. Coffin

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass Mat and brown sandy SILT (Topsoil)	
				Tan/brown medium sand, little fine gravel -FILL-	
3	3.0			Gray and black intermixed with ash, brick, wood, metal, coal and oyster shells -FILL-	Metal pipe encountered @ 3.0 ft. Excavated along length of pipe.
6	6.0			Tan medium to fine SAND, little silt -FILL-	
9					
12				Bottom of Exploration at 11.0 ft.	
15					

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
28 NOV 88	1.5	-

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 34 FEET WIDTH 20 FEET

BOULDERS

8" TO 18" DIAMETER - (number) - VOLUME - (cu ft)

OVER 18" DIAMETER - (number) - VOLUME - (cu ft)

SUMMARY

DEPTH 11.0 ft.

JAR SAMPLES -

BAG SAMPLES -

WATER LEVEL -

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP2

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +21

EXPLORATION DATE 28 NOV 88

H&A REP B. Miller, T. Coffin

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass Mat and brown sandy SILT (Topsoil)	
3		S2	2.0-5.0	Gray/brown medium SAND, some fine gravel intermixed with brick, wood, metal, glass, and copper piping -FILL-	Fuel oil tank @ 5.2' with visible product inside
6					
9					
12					
	13.0			Tan medium to coarse SAND, little fine gravel -FILL-	HNU Data (lab) Background - 1.0 ppm S1 -Negative reading S2 -Negative reading
15		S1	16.0-17.0		
18				Bottom of Exploration at 17.0 ft.	

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
20 NOV 88	0.5	16.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 23 FEET WIDTH 3.5 FEET

BOULDERS

8" TO 18" DIAMETER - (number) - VOLUME - (cu ft)

OVER 18" DIAMETER - (number) - VOLUME - (cu ft)

SUMMARY

DEPTH 17.0 ft.

JAR SAMPLES 2

BAG SAMPLES -

WATER LEVEL 16.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP3
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION +20
EXPLORATION DATE 28 NOV 88
H&A REP B. Miller / T. Coffin

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
0	0.2			Grass Mat and brown sandy SILT (Topsoil)	
3				Gray medium to coarse SAND, with some fine gravel, intermixed with fragments of brick, wood, and metal -FILL-	
6		S1	5.0		
	7.0			Red/tan intermixed BRICK and concrete -FILL-	
	8.0			Tan fine to coarse SAND, some silt and gravel, few boulders -FILL-	
9					
12					
15		S2	15.0-16.0		HNU Data (lab) Background = 1.2 ppm S1-Negative reading S2-Negative reading
				Bottom of Exploration at 16.0 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
28 NOV 88	0.75	-

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 23 FEET WIDTH 3.5 FEET

BOULDERS

8" TO 18" DIAMETER - (number) - VOLUME - (cu ft)

OVER 18" DIAMETER 2 (number) - VOLUME 0.5 cy (cu ft)

SUMMARY

DEPTH 16.0 ft.
JAR SAMPLES 2
BAG SAMPLES -
WATER LEVEL -

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Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP4
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION +22
EXPLORATION DATE 28 NOV 88
B. Miller
H&A REP T. Coffin

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Brown sandy SILT, grass mat (Topsoil)	
3				Brown-tan medium SAND intermixed with brick, concrete, metals, and glass -FILL-	
6					
	8.0				Stove or oven in fill at 7.0
	8.5			Concrete slab	
9				Brown silty SAND intermixed with trace fine to coarse gravel, brick fragments -FILL-	HNU Data (Lab) Background: 1.2 ppm S1: 13 ppm
12					
	13.0			Dark gray gravelly coarse SAND, some silt, trace rock fragments -FILL-	
15					
	16.0				
		S1	17.0 17.5	Tan silty fine to coarse SAND, little fine to coarse gravel	Brown film on water surface (<0.1 in.)
18				Bottom of Exploration at 17.5 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
28 NOV 88	0.6	17.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 27 FEET WIDTH 27 FEET

BOULDERS

8" TO 18" DIAMETER - - VOLUME -

OVER 18" DIAMETER 3 (number) - VOLUME 18 (cu ft)

SUMMARY

DEPTH 17.5 ft.
JAR SAMPLES 1
BAG SAMPLES -
WATER LEVEL 17.5 ft.

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Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP5

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +22

EXPLORATION DATE 29 NOV 88

H&A REP B. Miller, R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Brown sandy SILT, grass mat (Topsoil)	
3				Tan/light brown fine to coarse SAND, some gravel, little silt intermixed with fragments and pieces of brick and concrete -FILL-	
	3.8			Black/white SAND, little ash -FILL-	
	4.8			Brown gravelly coarse SAND, little cobble intermixed with fragments of porcelain, metal, wood, and glass -FILL-	
6					
9					
12					
15					
	15.5	S1	16.0 16.5	Tan gravelly fine to coarse SAND, some silt, little cobbles -FILL-	Very slight petroleum odor HNU Data Background: 0.4 ppm S1: 26 ppm
18				Bottom of Exploration at 16.5 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
29 NOV 88	0.5	16.0

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 33 FEET WIDTH 6 FEET

BOULDERS

8" TO 18" DIAMETER – (number) - VOLUME – (cu ft)

OVER 18" DIAMETER – (number) - VOLUME – (cu ft)

SUMMARY

DEPTH 16.5 ft.

JAR SAMPLES 1

BAG SAMPLES –

WATER LEVEL 16.0 ft.

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Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP6

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT E.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +21

EXPLORATION DATE 2 DEC 88

H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.8			ASPHALT pavement	
	1.5			Gray silty SAND subgrade -FILL-	
3				Gray silty fine to coarse SAND, some fine to coarse gravel, very few cobbles, brick and metal fragments -FILL-	Distinct petroleum odor
6					
9					
12	12.0				
		S1	13.0 16.0	Gray sandy SILT, some fine to coarse gravel	Very strong petroleum odor Product film on GW surface HNU Data (Lab) Background: 1.4 ppm S1: 150 ppm
15					
				Bottom of Exploration at 16.0 ft.	
18					

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
2 DEC 88	0.2	15.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 12.5 FEET WIDTH 4.5 FEET

BOULDERS

8" TO 18" DIAMETER 5 - VOLUME 5

OVER 18" DIAMETER 2 (number) - VOLUME 10 (cu ft)

SUMMARY

DEPTH 16.0 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 15.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP7
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION *19 to 24
EXPLORATION DATE 30 NOV 88
H&A REP B. Miller / R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.5			Grass mat and brown sandy SILT (Topsoil)	
	2.5			Gray sandy SILT, little fine to coarse gravel intermixed with rock fragments and pieces -FILL-	
3				Tan-brown silty SAND, little to trace fine to coarse gravel and cobbles intermixed with piping and fragments of brick, concrete, metal, wood, and ceramic -FILL-	Pipes at 3.0 ft.
6					
9					
	10.0			Gray silty SAND, some fine to coarse gravel, few cobbles -FILL-	Gray discolored horizon and strong gasoline odor
12					HNU Data Background: 1.4 ppm Soil pile: 350 ppm
		S1	14.0 16.0		S1: 180 ppm
15					
				Bottom of Exploration at 16.0 ft.	
18					

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
30 NOV 88	0.2	16.0

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 48 FEET WIDTH 18 FEET

BOULDERS

8" TO 18" DIAMETER 10 (number) - VOLUME 8 (cu ft)

OVER 18" DIAMETER 5 (number) - VOLUME 8 (cu ft)

SUMMARY

DEPTH 16.0 ft.
JAR SAMPLES 1
BAG SAMPLES -
WATER LEVEL 16.0 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP8

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +22

EXPLORATION DATE 29 NOV 88

H&A REP B. Miller / R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass Mat on brown sandy SILT (Topsoil)	
3				Brown-white silty SAND, some pieces, blocks of brick, concrete, metal, wood, porcelain, glass -FILL-	
6					Old foundation at 6 to 8 ft.
9					
	10.0			Brown fine sandy SILT, little to some clay, fine to coarse gravel -FILL-	
12	12.0			Brown medium to coarse SAND, little fine to coarse gravel -FILL-	HNU Data Background: 0.5 ppm S1: 6.2 ppm
15		S1	15.5 16.5	Brown silty medium to coarse SAND, little fine to coarse gravel -FILL-	Water entering pit rapidly, sheen on surface
18				Bottom of Exploration at 16.5 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
29 NOV 88	0.5	15.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 37 FEET WIDTH 3.5 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 10

OVER 18" DIAMETER 2 (number) - VOLUME 6 (cu ft)

SUMMARY

DEPTH 16.5 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 15.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP9

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +20

EXPLORATION DATE 29 NOV 88

H&A REP B. Miller, R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.5			Grass Mat and brown sandy SILT (Topsoil)	
3				Mottled tan-brown SAND, little fine to coarse gravel intermixed with brick fragments, granite blocks, concrete, metal, and wood -FILL-	
6	6.0			Collapsed brick wall from 6 to 8 ft. -FILL-	
	8.0				
9				Tan fine to medium SAND -FILL-	
12					HNU Data Background: 0.3 ppm S1: 140 ppm
		S1	14.0 16.0	Gray discolored zone	Sheen on water surface
15					
18				Bottom of Exploration at 16.5 ft.	

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
29 NOV 88	0.5	16

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 18 FEET WIDTH 4 FEET

BOULDERS

8" TO 18" DIAMETER - (number) - VOLUME - (cu ft)

OVER 18" DIAMETER - (number) - VOLUME - (cu ft)

SUMMARY

DEPTH 16.5 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 16.0 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP10

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +19

EXPLORATION DATE 30 NOV 88

H&A REP B. Miller
R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass Mat and brown sandy SILT (Topsoil)	
3				Brown silty fine to coarse SAND, some gravel intermixed with brick pieces, concrete blocks, cobblestones, metal, wire, wood, asphalt, and ceramic drain lines -FILL-	Concrete wall on north side of pit from 1.0 to 10.5 ft.
6					
9					
	10.5			Tan/light brown silty SAND to fine sandy SILT, little medium to coarse sand and fine gravel -FILL-	HNU Data Background: 1.2 ppm S1: 1.2 ppm
12					
		S1	14.0 16.0		
15					
				Bottom of Exploration at 16.0 ft.	
18					

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
30 NOV 88	0.5	15.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 22 FEET WIDTH 10 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 10

OVER 18" DIAMETER 6 (number) - VOLUME 15 (cu ft)

SUMMARY

DEPTH 16.0 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 15.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP11

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +19

EXPLORATION DATE 30 NOV 88

H&A REP B. Miller, R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.3			Grass Mat and brown sandy SILT (Topsoil)	
	2.0			Gray SILT, little sand and gravel -FILL-	
3	3.1			Black/gray/rust ASPHALT and concrete blocks	Concrete and brick foundation
				Tan-brown silty SAND, some fine to coarse gravel, few cobbles intermixed with wood, brick pieces, metal piping	
6	6.0			-FILL-	
				Rust-brown fine to coarse SAND, little to trace silt and fine gravel	
9				-FILL-	
					HNU Data Background: 1.2 ppm S1: 63 ppm
12					
15		S1	15.0		
	17.0		17.0		
				Gray fine to medium sandy SILT, few peat fibers	Water filling pit rapidly
18				Bottom of Exploration at 17.5 ft.	

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
30 NOV 88	0.5	16.0

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 20 FEET WIDTH 7 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 8

OVER 18" DIAMETER 5 (number) - VOLUME 10 (cu ft)

SUMMARY

DEPTH 17.5 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 16.0 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP12

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +24

EXPLORATION DATE 30 NOV 88

H&A REP B. Miller / R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.3			Grass Mat and brown sandy SILT (Topsoil)	
3				Mottled gray-brown gravelly SAND intermixed with brick pieces, concrete pieces, and wood -FILL-	
	5.5				
6				Tan silty fine to medium SAND, little to trace fine gravel, concrete pieces, and granite blocks -FILL-	Concrete blocks and granite blocks, seem to be in a pile
9					Lead and copper pipes
12					HNU Data Background: 0.8 ppm S1: 140 ppm Soil Pile: 225 ppm
15	15.0	S1	16.0 18.0	Gray silty SAND, little fine to coarse gravel and silt lenses	Gray-black discoloration and petroleum odor
18				Bottom of Exploration at 18.5 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
30 NOV 88	1.0	-

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 28 FEET WIDTH 11 FEET

BOULDERS

8" TO 18" DIAMETER 15 - VOLUME 12

OVER 18" DIAMETER 2 (number) - VOLUME 4 (cu ft)

SUMMARY

DEPTH 18.5 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL -

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP13
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION +21
EXPLORATION DATE 1 DEC 88
H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.3			Grass Mat and brown sandy SILT (Topsoil)	
				Gray silty SAND, trace coarse to fine gravel	
3	3.0			-FILL-	
				Brown-gray CONCRETE and BRICK blocks, some sand, little gravel, few cobbles	
6				-FILL-	
9					
	11.5				
12				Brown-gray silty SAND, some fine to coarse gravel	
				-FILL-	HNU Data Background: 1.2 ppm S1: 195 ppm
15		S1	15.0	Gray sandy GRAVEL, some silt	Distinct petroleum odor
			17.0	-FILL-	
18				Bottom of Exploration at 17.5 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
1 DEC 88	0.25	17.0

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 18 FEET WIDTH 10 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 10

OVER 18" DIAMETER 2 (number) - VOLUME 8 (cu ft)

SUMMARY

DEPTH 17.5 ft.
JAR SAMPLES 1
BAG SAMPLES -
WATER LEVEL 17.0 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP14

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +21

EXPLORATION DATE 1 DEC 88
B. Miller

H&A REP B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass Mat and brown sandy SILT (Topsoil)	
3				Tan-brown medium to coarse SAND, little silt and gravel intermixed with brick and wood fragments -FILL-	Encountered roadway and electrical manhole
6				Bottom of Exploration at 6.0 ft. Moved 10 ft. east	
9					
12					
15					
18					

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
-	-	-

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 15 FEET WIDTH 5 FEET

BOULDERS

8" TO 18" DIAMETER - (number) - VOLUME - (cu ft)

OVER 18" DIAMETER - (number) - VOLUME - (cu ft)

SUMMARY

DEPTH 6.0 ft.

JAR SAMPLES -

BAG SAMPLES -

WATER LEVEL -

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP14A

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +21

EXPLORATION DATE 1 DEC 88

H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass mat and brown sandy SILT (Topsoil)	
3				Gray/tan silty SAND, some gravel intermixed with brick fragments and stone curbing -FILL-	
	4.5			Brown silty SAND, little gravel intermixed with concrete blocks, brick fragments, wood, and rubber fragments -FILL-	Old road/pavement @ 4.5 ft.
6					
9					
12					
	14.0	S1	14.0-16.0	Gray sandy GRAVEL, little silt	HNU Data Background - 1.4 ppm S1 - 48 ppm Sample Wet 1.4 ppm HNU Sample 48 ppm Slight sheen on material
15					
18				Bottom of Exploration at 18.0 ft.	Filling slowly with water

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
1 DEC 88	0.25	17.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 22 FEET WIDTH 8 FEET

BOULDERS

8" TO 18" DIAMETER 10 (number) - VOLUME 10 (cu ft)

OVER 18" DIAMETER 5 (number) - VOLUME 50 (cu ft)

SUMMARY

DEPTH 18.0 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 17.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP15

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +18

EXPLORATION DATE 30 NOV 88

H&A REP B. Miller / R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass mat and brown sandy SILT (TOPSOIL)	
3				Mottled black/tan/rust gravelly SAND, some silt, intermixed with brick pieces, cobblestones, concrete fragments, asphalt blocks, metal and porcelain	
6				-FILL-	
9		S1	9.0-11.0		Oily gray/black residue coating material. Seepage @ 10.5 ft. above peat layer
12				Gray clayey SILT, plant fibers, gravel and little sand	
15				Bottom of Exploration at 14.0 ft.	HNU Data Background = 5.0 ppm S1 = 50 ppm

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
30 NOV 88	See Remarks	

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 19 FEET WIDTH 8 FEET

BOULDERS

8" TO 18" DIAMETER 6 - VOLUME 8

OVER 18" DIAMETER 3 (number) - VOLUME 30 (cu ft)

SUMMARY

DEPTH 14.0 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL See Remarks

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP16
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION +20
EXPLORATION DATE 1 DEC 88
H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass mat and brown sandy SILT (TOPSOIL)	
3				Brown silty SAND, trace brick pieces and metal fragments -FILL-	
	4.0			Black ASPHALT & CONCRETE paving -FILL-	
	4.5			Mottled tan/white/black silty SAND intermixed with brick, metal, wood fragments and glass -FILL-	Tank encountered @ 7.0 ft.
6		S2	7.0-9.0		Oil stain on NW wall @ about 11 ft.
9					Apparent fuel oil contamination in or on silt horizon.
		S1	11.0-14.0		HNU Data Background - 1.4 ppm S1 - 60 ppm S2 - 30 ppm
12	12.5				
				Gray/brown/black sandy SILT intermixed with ceramic pieces, plant fibers; black/gray discoloration; ceramic pieces probably from overlying strata	
15					
				Bottom of Exploration at 15.5 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
1 DEC 88	0.25	15.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 30 FEET WIDTH 28 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 10

OVER 18" DIAMETER 4 (number) - VOLUME 10 (cu ft)

SUMMARY

DEPTH 15.5 ft.
JAR SAMPLES 2
BAG SAMPLES -
WATER LEVEL 15.5 ft

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP17

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +27

EXPLORATION DATE 1 DEC 88

H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.5			Grass mat and brown sandy SILT (Topsoil)	
3				Brown/tan silty fine SAND, some medium to coarse sand and fine to coarse gravel, trace wood, brick fragments, metal pieces, concrete fragments and granite curbing -FILL-	
6					HNU Data Background - 1.4 ppm S1 - 5 ppm
9					
12					
15					
18		S1	18.0-19.0		
				Bottom of Exploration at 19.0 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
1 DEC 88	0.5	-

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 27 FEET WIDTH 12 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 10

OVER 18" DIAMETER 2 (number) - VOLUME 8 (cu ft)

SUMMARY

DEPTH 19.0 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL -

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP18
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION +19
EXPLORATION DATE 2 DEC 88
H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass mat and brown sandy SILT (Topsoil)	
	2.0	S2	2.0-4.0	White/red CONCRETE & BRICK fragments and pieces, little sand -FILL-	Slight petroleum odor during excavations
3	4.0			Brown gravelly medium to coarse SAND, some fine sand and silt, trace brick pieces and fragments intermixed with concrete fragments, wood and metal -FILL-	
6					
9					
12		S1	12.0-13.0		HNU Data Background-1.4-1.7ppm S1 - 1.4 ppm S2 - 1.7 ppm
		S3	13.0-14.0		
15				Bottom of Exploration at 14.0 ft.	Slowly filling with water HNU Data (Lab) Background - 1.4 ppm S3 - 7.0 ppm

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
2 DEC 88	0.2	13.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 17 FEET WIDTH 5.5 FEET

BOULDERS

8" TO 18" DIAMETER 5 - VOLUME 6

OVER 18" DIAMETER 0 (number) - VOLUME 0 (cu ft)

SUMMARY

DEPTH 14.0 ft.
JAR SAMPLES 2
BAG SAMPLES -
WATER LEVEL 13.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP19

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +22

EXPLORATION DATE 2 DEC 88

H&A REP B. Miller / B. Kickham

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.2			Grass mat and brown sandy SILT (Topsoil)	
3				Brown silty fine to coarse SAND, some fine to coarse gravel, trace brick fragments, intermixed with metal and concrete -FILL-	
	5.5			White CONCRETE road surface or cellar floor -FILL-	Slight petroleum odor after breaking through concrete
6	6.5			Tan silty SAND, little fine to coarse gravel -FILL-	HNU reading off excavated soil pile: 140 ppm
9					HNU Data Background- 1.2 ppm S1- 60 ppm
12					
	13.0	S1	13.5-15.5	Gray gravelly SAND, some silt -FILL-	
15					
18				Bottom of Exploration at 17.0 ft.	

WATER LEVEL		
DATE	TIME* (hours)	DEPTH (feet)
2 DEC 88	0.25	-

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 17 FEET WIDTH 5 FEET

BOULDERS

8" TO 18" DIAMETER 0 - VOLUME 0

OVER 18" DIAMETER 0 (number) - VOLUME 0 (cu ft)

SUMMARY

DEPTH 17.0 ft.

JAR SAMPLES S1

BAG SAMPLES -

WATER LEVEL -

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP20

FILE NO. 10003-41

PROJECT PARCEL 18

LOCATION BOSTON, MASSACHUSETTS

CLIENT F.R. HARRIS ENGINEERING

CONTRACTOR USED CROSSROADS CONSTRUCTION

EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan

ELEVATION +21

EXPLORATION DATE 2 DEC 88

H&A REP B. Kickham

B. Miller

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
	0.3			Grass mat and brown sandy SILT (Topsoil)	
3				Brown/tan silty SAND, some fine to coarse gravel intermixed with wood fragments and metal fragments -FILL-	
6					Road surface on west end of trench
	6.5			Red/white BRICK fragments, little sand intermixed with mortar, concrete fragments, wood, asphalt and shingles	Chimney/cellar wall
9					
	10.0			Light brown fine to medium SAND, little silt, coarse sand and fine to coarse gravel	
12					HNU Data(lab) Background - 1.4 ppm
					S1 - 4.6 ppm
15		S1	15.0-17.0		Water slowly entering pit @ about 16.5 ft.
18				Bottom of Exploration at 17.0 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
2 DEC 88	0.25	16.5

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 24 FEET WIDTH 5 FEET

BOULDERS

8" TO 18" DIAMETER 10 - VOLUME 10

OVER 18" DIAMETER 2 (number) - VOLUME 8 (cu ft)

SUMMARY

DEPTH 17.0 ft.

JAR SAMPLES 1

BAG SAMPLES -

WATER LEVEL 16.5 ft.

Form 24 Rev. Mar. 88

Haley & Aldrich, Inc.

TEST PIT REPORT

TEST PIT NO. TP21
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR USED CROSSROADS CONSTRUCTION
EQUIPMENT USED MITSUBISHI EXCAVATOR MS 180

LOCATION See Plan
ELEVATION +20
EXPLORATION DATE 29 NOV 88
H&A REP B. Miller, R. Wilhelm

SCALE IN FEET	STRATA CHANGE	SAMPLE NUMBER	SAMPLE DEPTH RANGE	DESCRIPTION OF MATERIALS	REMARKS
0	1.0			Grass mat and brown sandy SILT (Topsoil)	
				Tan fine to medium SAND -FILL-	
3					
	4.8			Tan fine to coarse SAND, intermixed with brick, concrete pieces and blocks, wood and glass -FILL-	
6					
9	9.0	S1	9.0-11.0	Gray fine to coarse SAND, little fine to coares gravel -FILL-	Distinct petroleum odor and discoloration of soil
12		S2	14.0-16.0		HNU Data Background-0.4 ppm S1-148 ppm S2-210 ppm At Bottom:200-300 ppm
15					
18				Bottom of Exploration at 17.0 ft.	

WATER LEVEL

DATE	TIME* (hours)	DEPTH (feet)
29 NOV 88	1	15

*AFTER COMPLETED

APPROXIMATE PIT DIMENSIONS AT SURFACE

LENGTH 26 FEET WIDTH 6 FEET

BOULDERS

8" TO 18" DIAMETER 15 - VOLUME 15

OVER 18" DIAMETER - (number) - VOLUME - (cu ft)

SUMMARY

DEPTH 17.0 ft.
JAR SAMPLES 2
BAG SAMPLES -
WATER LEVEL 15.0 ft.

Form 24 Rev. Mar. 88

Appendix D

APPENDIX D

Test Boring Logs

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 1
DATE
HOLE NO. B-1
LINE & STA.
OFFSET
SURF. ELEV. 16.0 NGVD

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.
PROJECT NAME Monitor Wells @ Parcel #18 | LOCATION Roxbury, Mass.
REPORT SENT TO above / Tremont St. | PROJ NO. 10003-41
SAMPLES SENT TO Taken at Site | OUR JOB NO 89-238

GROUND WATER OBSERVATIONS
At 15' after Hours 10/3/88
At after Hours

	CASING	SAMPLER	CORE BAR
Type	H/S/A	S/S	
Size I D	3-3/4"	1-3/8"	
Hammer Wt		140#	BIT
Hammer Fall		30"	

	Date	Time
START	10/3/88	a.m. p.m.
COMPLETE	10/4/88	a.m. p.m.
TOTAL HRS.		
BORING FOREMAN	P. Brown	
INSPECTOR	S. Kelly	
SOILS ENGR.		

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	10	25	26			Brown coarse to fine SAND, little silt, brick & concrete - Fill	1	24"	18"
						26						
		5'-7'	D	3	3	4			Brown fine SAND, little silt, trace of coarse to medium sand, brick Fill	2	24"	6"
						6						
		10'-12'	D	4	6	10			Light Brown medium to fine SAND, trace brick - Fill	3	24"	20"
						5						
		12'-14'	D	5	11	14		13.5'	Light Brown fine SAND, trace of silt, brick	4	24"	24"
						12						
		14'-16'	D	10	18	11			Brown SILT, occasional fine Sand Layers	5	24"	24"
						16						
		16'-18'	D	21	15	30			Brown silty fine SAND, little coarse to medium sand, trace fine gravel	6	24"	24"
						34						
		18'-20'	D	10	25	33			Silty fine GRAVEL, some coarse to fine sand	7	24"	9"
						24						
		20'-22'	D	13	9	13			Medium to fine SAND, little silt, coarse to fine gravel	8	24"	24"
						19						
		22'-24'	D	20	16	16			Brown coarse to fine sandy SILT, occasional fine sand layers, trace of clay	9	24"	19"
						39						
		24'-26'	D	36	27	40			Brown fine gravelly coarse to fine SAND, some silt	10	24"	20"
						32		26.5'				
		26'-28'	D	5	9	11			Gray Silty CLAY, frequent medium to fine sand layers	11	24"	20"
						13						
		28'-30'	D	31	11	9			Gray Silty CLAY, frequent fine sand layers	12	24"	15"
						10		30'				
									Bottom of Boring 30'			
									Installed Observation Well @ 22'			

GROUND SURFACE TO USED "CASING: THEN

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 30'
Rock Coring
Samples 12

HOLE NO B-1

TOWN PRESS — EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R I

SHEET 1 OF 2

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.

PROJECT NAME Monitor Wells @ Parcel | LOCATION Roxbury, Mass.

REPORT SENT TO Above / #18-Tremont St. | PROJ NO

SAMPLES SENT TO Taken At Site. | OUR JOB NO 89-238

DATE

HOLE NO B-2 A, B, C

LINE & STA.

OFFSET

SURF. ELEV. 13.4 NGVD

GROUND WATER OBSERVATIONS

At 15' after ____ Hours

At ____ after ____ Hours

	CASING	SAMPLER	CORE BAR
Type	H/S	S/S	
Size I D	Auger	1-3/8"	
Hammer Wt		140#	BIT
Hammer Fall		30"	

	Date	Time
START	10/4/88	a.m. p.m.
COMPLETE	10/5/88	a.m. p.m.
TOTAL HRS.		

BORING FOREMAN P. Brown

INSPECTOR S. Kelly

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	20	29	39				1	24"	20"
				20					Brown coarse to fine SAND (Fine)			
		5'-6'2"	D	10	36	100/2"				2	14"	9"
		10'-11'2"	D	14	74	100/2"				3	14"	12"
									(B-2 A & B) Two attempts made to go down, hit			
								10'	obstructions, cobbles noted			
		10'-12'	D	1	2	2			Dark Brown organic SILT,	3A	24"	24"
				2					trace of Fill			
		12'-14'	D	2	2	2				4	24"	18"
				2								
		14'-16'	D	2	1	2				5	24"	20"
				1				16'				
		16'-18'	D	WOR	3	4			PEAT	6	24"	24"
				4								
		18'-20'	D	1	1	2			Dark Brown organic SILT, trace of fine Sand, gravelly	7	24"	24"
				15				20'	sand layers			
		20'-22'	D	11	14	16			Gray GRAVEL, coarse tof	8	24"	14"
				12					fine Sand, trace of Silt			
		22'-24'	D	14	22	18				9	24"	12"
				14								
		24'-26'	D	17	21	24				10	24"	10"
				64								
		26'-28'	D	7	13	62				11	24"	24"
				64								
		28'-29.5'	D	24	29	50				12	18"	18"
		30'-32'	D	17	36	70				13	24"	20"
				100/6"				32'				
									Bottom of Boring 32'			

GROUND SURFACE TO 30' USED HSA "CASING: THEN Installed Well

Sample Type
D=Dry C=Cored W=Washed
UP=Undisturbed Piston
TP=Test Pit A=Auger V=Vane Test
UT=Undisturbed Thinwall

Proportions Used
trace 0 to 10%
little 10 to 20%
some 20 to 35%
and 35 to 50%

140 lb Wt. x 30" fall on 2" O D Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY
Earth Boring 32'
Rock Coring
Samples 13

HOLE NO B-2 A, B

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE R I

SHEET 2 OF 2

DATE

HOLE NO. B-2-A, B, C

LINE & STA.

OFFSET

SURF. ELEV.

TO | ADDRESS

PROJECT NAME | LOCATION

REPORT SENT TO | PROJ. NO

SAMPLES SENT TO | OUR JOB NO 89-238

GROUND WATER OBSERVATIONS

At _____ after _____ Hours

At _____ after _____ Hours

	CASING	SAMPLER	CORE BAR
Type			
Size I D			
Hammer Wt			BIT
Hammer Fall			

	Date	Time
START		a.m. p.m.
COMPLETE		a.m. p.m.
TOTAL HRS.		

BORING FOREMAN

INSPECTOR

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc. Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
								32'				
									Bottom of Boring 32'			
									Installed (2" Sch. 40 PVC)			
									Well			
									2-Bags of Ottawa Sand			
									20-lbs. Bentonite Pellets			
									1-Bag of Cement			
									1-Small Road Box			
									10'-Screen			
									20'-Riser			

GROUND SURFACE TO _____ USED _____ "CASING: THEN _____

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency		
0-10	Loose	0-4	Soft	30 + Hard
10-30	Med. Dense	4-8	M/Stiff	
30-50	Dense	8-15	Stiff	
50 +	Very Dense	15-30	V-Stiff	

SUMMARY

Earth Boring _____

Rock Coring _____

Samples _____

HOLE NO B-2-A, B, C

TOWN PRESS - EAST PROV.

GUILD DRILLING CO., INC.

100 WATER STREET EAST PROVIDENCE, R. I

SHEET 1 OF 1

TO Haley & Aldrich, Inc. | ADDRESS Cambridge, Mass.

PROJECT NAME Monitor Wells @ Parcel | LOCATION Roxbury, Mass.

REPORT SENT TO Above / #18-Tremont St. | PROJ NO

SAMPLES SENT TO Taken At Site. | OUR JOB NO 89-238

DATE

HOLE NO B-3

LINE & STA.

OFFSET

SURF. ELEV. 14.3 NGVD

GROUND WATER OBSERVATIONS

At 16 after Hours

At after Hours

	CASING	SAMPLER	CORE BAR
Type	H/S	S/S	
Size I.D	Auger	1-3/8"	
Hammer Wt		140#	BIT
Hammer Fall		30"	

	Date	Time
START	10/5/88	a.m. p.m.
COMPLETE	10/7/88	a.m. p.m.
TOTAL HRS.		

BORING FOREMAN P. Brown

INSPECTOR S. Kelly

SOILS ENGR.

LOCATION OF BORING

DEPTH	Casing Blows per foot	Sample Depths From - To	Type of Sample	Blows per 6" on Sampler From 0-6	To 6-12	To 12-18	Moisture Density or Consist.	Strata Change Elev	SOIL IDENTIFICATION Remarks include color, gradation, Type of soil etc Rock-color, type, condition, hardness, Drilling time, seams and etc	SAMPLE No	Pen	Rec
		0'-2'	D	24	36	50			Brown coarse to fine SAND (Fill)	1	24"	24"
				66								
		5'-7'	D	4	6	7			Brown medium to fine SAND & Gravel, trace of Silt (Fill)	2	24"	14"
				9								
		10'-12'	D	32	16	73				3	24"	20"
				52								
		12'-14'	D	68	53	26			Brown medium to fine SAND, Gravel & Fill (chemical odor noted)	4	24"	14"
				25								
		14'-16'	D	18	29	28				5	24"	10"
				25				16'				
		16'-18'	D	14	16	36			Brown coarse to fine SAND, occasional Silt Layers, Fill	6	24"	12"
				46								
		18'-20'	D	30	47	29				7	24"	18"
				11								
		20'-22'	D	8	13	16			Fine to medium SAND, little Silt	8	24"	24"
				22								
		22'-24'	D	16	16	13				9	24"	20"
				14				23'6"				
		24'-26'	D	4	4	4			CLAY, Silt	10	24"	24"
				7					" ", trace of silty fine			
								26'	Sand			
									Bottom of Boring 26'			
									Installed (2" Sch. 40 PVC) Monitor Well @ 24'			
									10'-Screen			
									14'-Riser			
									3-Bags of Ottawa Sand			
									25-1bs. Bentonite Pellets			
									1-Small Road Box			

GROUND SURFACE TO 26' USED HSA "CASING: THEN Installed Well

Sample Type

D=Dry C=Cored W=Washed

UP=Undisturbed Piston

TP=Test Pit A=Auger V=Vane Test

UT=Undisturbed Thinwall

Proportions Used

trace	0 to 10%
little	10 to 20%
some	20 to 35%
and	35 to 50%

140 lb Wt. x 30" fall on 2" O.D. Sampler

Cohesionless Density		Cohesive Consistency	
0-10	Loose	0-4	Soft
10-30	Med. Dense	4-8	M/Stiff
30-50	Dense	8-15	Stiff
50 +	Very Dense	15-30	V-Stiff
		30 +	Hard

SUMMARY:

Earth Boring 26'

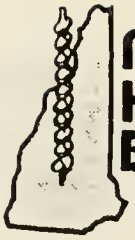
Rock Coring

Samples 10

HOLE NO B-3

TOWN PRESS - EAST PROV.

BORING LOG



NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-3-89
DATE END
1-3-89
SHEET 1 **OF** 1
BORING #
B-3B OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-3-89	17'	well @ 24'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	18"	40-47		Fill: sand, gravel, glass, red brick, cinders, ash.
					20-24		
	S-2	3'-5'	24"	10"	20-19		
5'					19-16		
	S-3	5'-7'	24"	6"	4-3		
					4-3		
	S-4	7'-9'	24"	15"	6-9		
					27-71		
10'	S-5	9'-11'	24"	0"	35-39		Cobbles.
					72-82		
	S-6	11'-13'	24"	16"	67-39		
					20-28	13'	Hard silty clay little coarse to fine gravel, little fine sand.
	S-7	13'-15'	24"	18"	19-28		
15'					13-18		
	S-8	15'-17'	24"	20"	7-22		
					58-50	17'	Dense to medium dense, medium to fine sand, clay and silt layers.
	S-9	17'-19'	24"	4"	45-33		
					18-26		
20'							
	S-10	20'-22'	24"	18"	5-7		
					12-10		
	S-11	22'-24'	24"	24"	7-7	23'6"	Stiff silty clay, trace fine sand.
					7-11		
25'	S-12	24'-26'	24"	24"	5-7		
					7-8		
	S-13	26'-28'	24"	24"	9-6		
					6-5		
						28'	Required depth.
30'							Well at 23'.

DRILLER: R. Mallardo ***HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: 10' slotted .010 slot, 14' riser pipe, 1 road box, 3 bags of cement grout, 3 bags of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-19-88
DATE END
12-20-88
SHEET 1 **OF** 2

BORING #
B-4 ow
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-20-88	17'	well @ 21'	

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, cinders, red brick, cement, glass.
	S-1	1'-3'	24"	12"	7-4		
					10-31		
	S-2	3'-5'	24"	12"	26-23		
					23-21		
5'	S-3	5'-7'	24"	20"	20-32		
					57-41		
	S-4	7'-8'2"	14"	14"	29-30		
					100/2"		
	S-5	9'-11'	24"	16"	10-8		
10'					13-37		
	S-6	11'-12'6"	18"	15"	57-80		
					100/6"		
	S-7	13'-15'	24"	18"	34-67		
					35-42		
15'	S-8	15'-17'	24"	23"	28-38		
					29-23	17'	Dense fine to medium sand, trace fine gravel, clay lenses.
	S-9	17'-19'	24"	21"	13-25		
					27-24		
20'	S-10	19'-21'	24"	15"	13-15		
					28-17		
	S-11	21'-23'	24"	24"	25-17		
					13-18	23'	Medium dense fine medium sand, frequent clay layers.
	S-12	23'-25'	24"	24"	4-5		
					9-3		
25'	S-13	25'-27'	24"	24"	5-10		
					21-17		
						28'	Medium stiff silty clay.
30'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-19-88
DATE END
12-20-88
SHEET 2 **OF** 2

BORING #
B-4 ow
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-14	30'-32'	24"	24"	3-4		Medium stiff silty clay.
					4-5	32'	Required depth.
							Well at 21'.
35'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 11' riser, 1 road box, 3 bags of cement, 3 bags of silica sand, 2 pails of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-20-88
DATE END
12-20-88
SHEET 1 **OF** 1
BORING #
B-5 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-20-88	16'	well at 21'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	16"	20-16		Fill: sand, gravel, glass, red brick, cinders, glass, clay, silt.
					21-20		
	S-2	3'-5'	24"	14"	16-24		
5'					20-19		
	S-3	5'-7'	24"	14"	4-4		
					16-4		
	S-4	7'-9'	24"	19"	6-13		
					40-42		
10'	S-5	9'-11'	24"	20"	28-25		
					22-16		
	S-6	11'-13'	24"	24"	18-22		
					24-18		
	S-7	13'-15'	24"	24"	10-20		
15'					29-20	15'	Dense medium to fine sand, little coarse to fine gravel.
	S-8	15'-17'	24"	10"	10-24		
					26-25		
	S-9	17'-19'	24"	24"	17-16		
					16-16	19'	Stiff silty clay.
20'	S-10	19'-21'	24"	24"	6-6		
					5-7		
	S-11	21'-23'	24"	24"	4-5		
					6-7	23'	Required depth. Well at 21'.
25'							
30'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 11' riser, 1 road box, 3 bags of cement grout, 3 bags of silica sand, 1 pail of bentonite.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-20-88
DATE END
12-21-88
SHEET 1 **OF** 1

BORING #
B-6 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-21-88	19'	well @ 24'	Upon completion.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, red brick, silt, clay, concrete.
	S-1	1'-3'	24"	24"	22-50		
					58-80		
	S-2	3'-5'	24"	21"	60-54		
					29-39		
5'	S-3	5'-7'	24"	18"	9-10		
					39-43		
	S-4	7'-9'	24"	15"	25-17		
					13-9		
	S-5	9'-11'	24"	15"	11-8		
10'					9-11	11'	Very dense silty fine sand and gravel some medium sands, trace of clay poss. Fill.
	S-6	11'-13'	24"	8"	20-38		
					74-40		
	S-7	13'-15'	24"	14"	25-20		
					24-42		
15'	S-8	15'-17'	24"	18"	25-33		
					29-35		
	S-9	17'-19'	24"	17"	26-31	18'	Dense to very dense medium to fine sand, little coarse sand and gravel.
					16-23		
	S-10	19'-21'	24"	18"	18-21		
20'					28-41		
	S-11	21'-23'	24"	24"	25-35		
		BLOW IN AT 23'				24'	Stiff to very stiff silty clay.
25'	S-12	25'-27'	24"	24"	4-5		
					10-12		
	S-13	27'-29'	24"	4"	14-4		
					15-16	29'	Required depth.
30'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: Well at 24'.
10' slotted, 14' riser, 1 road box, 3 bags of cement grout, 3 bags of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

PROJECT	Parcel 18 & 18B Boston, MA
PROJECT #	10003-41
DATE START	12-21-88
DATE END	12-22-88
SHEET	1 OF 2
BORING #	B-7 ow
LOCATION	See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-22-88	16'6"	well @ 21'	upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	6"	18-22		Fill: sand, gravel, grass, silt, glass, red brick, wood, cinders.
					9-1		
	S-2	3'-5'	24"	4"	5-6		
					12-15		
5'	S-3	5'-7'	24"	18"	88-22		
					18-17		
	S-4	7'-9'	24"	11"	13-10		
					7-3		
	S-5	9'-11'	24"	16"	2-3		
10'					4-6		
	S-6	11'-13'	24"	12"	3-		
					1/18"		
	S-7	13'-15'	24"	24"	26-24		
					63-54		
15'	S-8	15'-17'	24"	18"	40-29	16'	Dense fine to medium sand, layers of clay, silt.
					26-23		
	S-9	17'-19'	24"	24"	15-17		
					18-13		
20'	S-10	20'-22'	24"	24"	5-13		
					12-13		
	S-11	22'-24'	24"	24"	11-19		
					24-26		
	S-12	24'-26'	24"	18"	7-8		
25'					10-9		
	S-13	26'-28'	24"	24"	6-8	27'	Medium stiff silty clay, trace fine sand.
					8-9		
	S-14	28'-30'	24"	20"	2-3		
30'					5-6		

DRILLER: R. Mallardo HELPER: R. Burne INSPECTOR: J. Bode

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-21-88
DATE END
12-22-88
SHEET 2 **OF** 2
BORING #
B-7 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

"GROUNDWATER OBSERVATIONS"

OATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	SAMPLE PENETRATION	SAMPLE RECOVERY	SAMPLE BLOWS/6"	STRATA CHANGE	SAMPLE OESCRIPTION
	S-15	30'-32'	24"	24"	8-8		Stiff silty clay, trace fine sand.
					4-5	32'	Required Depth.
							Well installed at 21'.

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 11' riser, 1 road box, 3 bags of cement grout, 3 bags of silica sand, 2 pails of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-22-88
DATE END
12-23-88
SHEET 1 **OF** 2
BORING #
B-8 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-23-88	20'6"	well @ 25'6"	upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	20"	17-9		Fill: sand, gravel, cobbles, cinders, red brick, glass, silt, clay.
					14-14		
	S-2	3'-5'	24"	0"	28-29		
					44-35		
5'	S-3	5'-7'	24"	17"	20-8		
					15-19		
	S-4	7'-9'	24"	15"	11-13		
					10-10		
	S-5	9'-11'	24"	16"	4-6		
10'					9-8		
	S-6	11'-13'	24"	14"	11-10		
					7-6		
	S-7	13'-15'	24"	16"	11-19		
					14-9		
15'	S-8	15'-17'	24"	14"	11-8		
					6-10		
	S-9	17'-19'	24"	0"	11-23		
					22-14	19'	Very stiff medium to fine sandy silt, trace of gravel and brick.
20'	S-10	19'-21'	24"	8"	8-8		
					8-7		
	S-11	21'-23'	24"	9"	11-7		
					4-3	23'	Soft organic silt layers of fine sand.
	S-12	23'-25'	24"	24"	1-1		
					2-2		
25'	S-13	25'-27'	24"	24"	1-1		
					2-3		
	S-14	27'-29'	24"	24"	3-3		
					12-13		
30'						29'	Hard yellow-brown silty clay

DRILLER: R. Mallardo **HELPER:** R.Burne **INSPECTOR:** J. Bode/D. Warren

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

PROJECT: Parcel 18 & 18B
Boston, MA
PROJECT #: 10003-41
DATE START: 12-22-88
DATE END: 12-23-88
SHEET 2 OF 2
BORING #: B-8 OW
LOCATION: See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

"GROUNDWATER OBSERVATIONS"

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-14	29'-31'	24"	18"	23-40		Hard yellow silty clay, sand lenses.
					31-43		
	S-15	31'-33'	24"	24"	45-21	33'	Required depth.
					21-21		
35'							Well at 25'6".

DRILLER: R. Mallardo HELPER: R. Burne INSPECTOR: J. Bode/ Dwight

REMARKS: 10' slotted, 15'6" riser, 1 raod box, 3 bags of cement grout, 3 bags of silica sand, 2 pails of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-11-89
DATE END
1-11-89
SHEET 1 **OF** 2

BORING #
B-9 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-11-89	15'	well @ 21'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, red brick, glass silt, clay.
	S-1	1'-3'	24"	8"	25-15		
					10-11		
	S-2	3'-5'	24"	14"	21-34		
					112-65		
5'	S-3	5'-7'	24"	18"	10-14		
					15-17		
	S-4	7'-9'	24"	5"	22-34		
					17-13		
10'	S-5	9'-11'	24"	8"	8-11		
					8-17		
	S-6	11'-13'	24"	10"	12-7		
					15-41		
	S-7	13'-15'	24"	20"	37-45		
					119-50/2"	15'	Very dense medium to fine sand, little coarse sand and fine gravel, silt, clay layers.
15'	S-8	15'-17'	24"	18"	14-31		
					35-36		
	S-9	17'-19'	24"	18"	33-30		
					40-24		
20'	S-10	20'-22'	24"	20"	30-30		
					23-40		
	S-11	22'-24'	24"	20"	33-43		
					38-41		
25'	S-12	24'-26'	24"	14"	31-24		
					22-16		
	S-13	26'-28'	24"	24"	11-11		
					16-20		
						29'	Very stiff gray silty clay
30'							

DRILLER: R. Mallardo **HELPER:** P. Michaud **INSPECTOR:** J. Bode

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-11-89
DATE END
1-11-89
SHEET 2 **OF** 2

BORING #
B-9 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

"GROUNDWATER OBSERVATIONS"

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-14	30'-32'	24"	24"	9-13		Very stiff to stiff silty clay.
					15-16		
	S-15	32'-34'	24"	18"	11-6		
					5-8	34'	Required depth.
35'							Well installed at 21'.

DRILLER: R. Mallardo **HELPER:** P. Michaud **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 11' riser, 1 road box, 3 bags cement grout, 3 bags silica sand, 2 pails bentonite.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-10-89
DATE END
1-10-89
SHEET 1 **OF** 1

BORING #
B-10 ow
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

"GROUNDWATER OBSERVATIONS"

DATE	DEPTH	CASING	STABILIZATION PER.
1-10-89	22'	well @ 27'	Upon completion.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	18"	15-18		Fill: sand, gravel, red brick, cinders, silt, clay.
					10-8		
	S-2	3'-5'	24"	6"	32-35		
					27-26		
5'	S-3	5'-7'	24"	8"	13-10		
					4-9		
	S-4	7'-9'	24"	4"	5-4		
					5-55		
	S-5	9'-11'	24"	8"	18-7		
10'					4-5		
	S-6	11'-13'	24"	14"	9-16		
					18-15		
	S-7	13'-15'	24"	14"	34-26		
					39-28	15'	Very dense medium to fine sand, layers of silty clay, trace of fine gravel.
15'	S-8	15'-17'	24"	10"	12-21		
					26-29		
	S-9	17'-19'	24"	18"	37-44		
					46-36		
20'	S-10	20'-22'	24"	24"	14-10	20'	Very stiff silty clay and clayey silt
					10-14		
	S-11	22'-24'	24"	24"	7-14		
					7-6	24'	Medium stiff silty clay.
	S-12	24'-26'	24"	24"	1-2		
25'					4-6		
	S-13	27'-29'	24"	18"	2-4		
					3-5	29'	Required depth.
30'							

DRILLER: R. Mallardo **HELPER:** P. Michaud **INSPECTOR:** J. Bode

REMARKS: well installed at 27'.
10' slotted, 17' riser, 1 road box, 4 bags cement grout, 3 bags of silica sand, 2 pails of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

PROJECT: Parcel 18 & 18B
Boston, MA
PROJECT #: 10003-41
DATE START: 1-9-89
DATE END: 1-10-89
SHEET 1 OF 2
BORING #: B-11 OW
LOCATION: See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

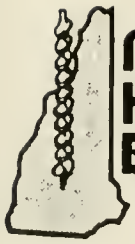
DATE	DEPTH	CASING	STABILIZATION PER.
1-10-89	17'	well @ 23'	upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, clay, silt.
	S-1	1'-3'	24"	20"	32-49		
					24-16		
	S-2	3'-5'	24"	14"	16-12		
5'					14-16		
	S-3	5'-7'	24"	19"	28-21		
					21-19		
	S-4	7'-9'	24"	19"	11-10		
					9-8		
10'	S-5	9'-11'	24"	15"	13-10		
					7-5		
	S-6	11'-13'	24"	18"	11-11		
					8-12		
	S-7	13'-15'	24"	21"	15-14		
					13-24	15'	Very dense coarse to fine sand.
15'	S-8	15'-17'	24"	20"	29-38		
					33-100		
	S-9	17'-19'	24"	8"	38-70		
					27-34		
						20'	Medium dense to dense coarse to fine sand.
20'	S-10	20'-22'	24"	18"	9-10		
					18-18		
	S-11	22'-24'	24"	20"	16-23		
					26-24	24'	Very stiff silty clay and clayey silt, little fine sand.
25'	S-12	24'-26'	24"	20"	11-8		
					10-13		
	S-13	26'-28'	24"	20"	12-10		
					13-16	27'6"	Very stiff silty clay.
	S-14	28'-30'	24"	24"	7-8		
30'					9-11		

DRILLER: R. Mallardo HELPER: P. Michaud INSPECTOR: J. Bode

REMARKS:

BORING LOG



NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-9-89
DATE END
1-10-89
SHEET 2 **OF** 2

BORING #
B-11 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-15	30'-32'	24"	18"	4-3		Stiff silty clay.
					8-6	32'	Required depth
							Well installed at 23'.
35'							

DRILLER: R. Mallardo **HELPER:** P. Michaud **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 13' riser, 1 road box, 3 bags cement grout, 3 bags of silica sand, 2 pails of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-27-88
DATE END
12-27-88
SHEET 1 **OF** 1
BORING #
B-12 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-27-88	16'6"	well @ 22'	Upon completion.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, silt, clay, red brick.
	S-1	1'-3'	24"	20"	20-21		
					21-22		
	S-2	3'-5'	24"	8"	18-15		
5'					14-14		
	S-3	5'-7'	24"	24"	20-34		
					19-12		
	S-4	7'-9'	24"	15"	19-20		
					14-11		
	S-5	9'-11'	24"	20"	8-6		
10'					5-8		
	S-6	11'-13'	24"	20"	14-44		
					66-56		
	S-7	13'-15'	24"	20"	33-29		
					19-12		
15'	S-8	15'-17'	24"	24"	7-19	16'	Dense medium to fine sand, trace coarse sand, trace fine gravel.
					33-22		
	S-9	17'-19'	24"	22"	12-17		
					21-42		
	S-10	19'-21'	24"	12"	15-21		
20'					17-11		
	S-11	21'-22'6"	18"	10"	10-12		
					28-100/0		
						25'	Very stiff silty clay.
25'	S-12	25'-27'	24"	24"	WOR-9		
					11-11		
	S-13	27'-29'	24"	15"	4-8		
					8-10	29'	Required depth.
30'							

DRILLER: R. Mallardo **HELPER:** R . Burne **INSPECTOR:** J. Bode

REMARKS: Well at 22'.
10' slotted, 12' riser, 1 road box, 3 bags of cement grout, 3 baga of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-28-88
DATE END
12-29-88
SHEET 1 **OF** 1

BORING #
B-13 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-29-88	17'	well @ 22'	Upon completion.

DEPTH	SAMPLE #	SAMPLE DEPTH	SAMPLE PENETRATION	SAMPLE RECOVERY	SAMPLE BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	21"	18-24		Fill: sand, gravel, silt, red brick, stones.
					24-25		
	S-2	3'-5'	24"	20"	42-50		
					45-47		
5'	S-3	5'-7'	24"	20"	22-31		
					42-15		
	S-4	7'-9'	24"	10"	27-45		
					50-38		
	S-5	9'-11'	24"	12"	46-50		
10'					116-22		
	S-6	11'-13'	24"	21"	11-17		
					31-54		
	S-7	13'-15'	24"	20"	20-18		
					22-33		
15'	S-8	15'-17'	24"	20"	21-26	15'	Dense medium to coarse sand, with layers of fine sandy silt and clay.
					25-30		
	S-9	17'-19'	24"	8"	21-21		
					19-14		
20'	S-10	20'-22'	24"	24"	12-7	20'	
					9-8		Stiff silty clay, trace fine sand
	S-11	22'-24'	24"	24"	5-6		
					6-7	24'	Required depth. Well at 22'.
25'							
30'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 12' riser, 1 road box, 3 bags cement, 3 bags silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
12-28-88
DATE END
12-28-88
SHEET 1 **OF** 1
BORING #
B-14 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER
12-28-88	16'	well @ 22'	Upon completion.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	12"	7-8		Fill: sand, gravel, cinders, glass, red brick, cobbles.
					16-29		
	S-2	3'-5'	24"	18"	25-30		
					26-29		
5'	S-3	5'-7'	24"	17"	15-6		
					11-8		
	S-4	7'-9'	24"	14"	5-6		
					5-6		
	S-5	9'-11'	24"	18"	7-5		
10'					20-52		
	S-6	11'-13'	24"	15"	108-65		
					110-20		
	S-7	13'-15'	24"	12"	13-15		
					8-6		
15'	S-8	15'-17'	24"	21"	3-5	16'	Dense to medium dense, medium to fine sand, little coarse sand with sandy silt layers.
					15-14		
	S-9	17'-19'	24"	24"	20-23		
					30-20		
20'	S-10	20'-22'	24"	22"	7-10		
					19-11		
	S-11	22'-24'	24"	24"	6-10		
					12-12	24'	Stiff silty clay.
25'	S-12	24'-26'	24"	21"	11-6		
					7-7		
	S-13	26'-28'	24"	24"	5-8		
					8-7	28'	Required depth.
30'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS: Well at 22'.
10' slotted, 12' riser, 1 road box, 3 bags of cement grout, 3 bags of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

PROJECT: Parcel 18 & 18B, Boston, MA
PROJECT #: 10003-41
DATE START: 12-29-88
DATE END: 12-30-88
SHEET 1 OF 1
BORING #: B-15 ow
LOCATION: See plan

	CASING	SAMPLER
TYPE:	HSA	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
12-29-88	17'	well @ 23'	upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, silt, clay, red brick.
	S-1	1'-3'	24"	14"	9-12		
					26-28		
	S-2	3'-5'	24"	12"	25-23		
					20-14		
5'	S-3	5'-7'	24"	20"	3-4		
					5-5		
	S-4	7'-9'	24"	20"	8-28		
					58-69		
		9	0	0"	100/0"		
10'	S-5	10'-10'6"	6	4"	145/6		
	S-6	13'-15'	24"	20"	34-21		
					22-24	15'	Dense medium to fine sand, layers of sandy silt and clay.
15'	S-7	15'-17'	24"	20"	11-19		
					22-12		
	S-8	17'-19'	24"	24"	13-17		
					23-28		
						19'6"	Very stiff silty clay.
20'	S-9	20'-22'	24"	24"	11-12		
					14-18	22'	Medium dense medium to coarse sand.
	S-10	22'-24'	24"	24"	7-10		
					10-11	24'	Stiff silty clay.
25'	S-11	24'-26'	24"	24"	5-4		
					6-6		
	S-12	26'-28'	24"	24"	WOR-6		
					7-9	28'	Required depth.
30'							

DRILLER: R. Mallardo HELPER: R. Burne INSPECTOR: J. Bode

REMARKS: Well at 23'.
10' slotted, 13' riser, 1 road box, 3 bags of cement grout, 3 bags of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-3-89
DATE END
1-4-89
SHEET 1 **OF** 2
BORING #
B-16 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-4-89	17'	well @ 23'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	20"	26-130		Fill: sand, gravel, red brick, silt, cinders, cobbles.
					34-24		
	S-2	3'-5'	24"	6"	100-62		
					42-35		
5'	S-3	5'-7'	24"	4"	7-10		
					8-9		
	S-4	7'-9'	24"	4"	10-10		
					11-12		
	S-5	9'-11'	24"	17"	13-25		
10'					58-71		
	S-6	11'-13'	24"	15"	89-62		
					32-47		
	S-7	13'-15'	24"	18"	18-42		
					47-34		
15'	S-8	15'-17'	24"	18"	13-24		
					18-19	17'	Dense medium to fine sand, trace coarse sand, clay and silt layers.
	S-9	17'-19'	24"	20"	16-45		
					26-28		
20'	S-10	20'-22'	24"	20"	13-20		
					18-19		
	S-11	22'-24'	24"	24"	10-20		
					39-24		
25'	S-12	25'-27'	24"	18"	9-15		
					19-19		
						29'	Soft silty clay.
30'							

DRILLER: R. Mallardo **HELPER:** R. Burne **INSPECTOR:** J. Bode

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

PROJECT: Parcel 18 & 18B
Boston, MA
PROJECT #: 10003-41
DATE START: 1-3-89
DATE END: 1-3-89
SHEET 2 OF 2
BORING #: B-16 OW
LOCATION: See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-13	30'-32'	24"	24"	3-3		Soft silty clay.
					4-7		
	S-14	32'-34'	24"	18"	WOR		
						34'	Required depth.
35'							Well at 23'.
40'							

DRILLER: R. Mallardo HELPER: R. Burne INSPECTOR: J. Bode

REMARKS: 10' slotted, 13' riser, 1 road box, 3 bags of silica sand, 2 pails of bentonite pellets, 3 bags of cement grout.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-6-89
DATE END
1-9-89
SHEET 1 **OF** 1

BORING #
B-17 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-6-89	15'	well @ 21'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	20"	39-50		Fill: sand, gravel, red brick, cinder silt, clay, glass.
					33-22		
	S-2	3'-5'	24"	10"	22-17		
5'					12-9		
	S-3	5'-6'4"	16"	12"	15-16		
					100/4"		
	S-4	7'-9'	24"	12"	7-12		
					31-21		
10'	S-5	9'-11'	24"	14"	18-17		
					19-18		
	S-6	11'-13'	24"	18"	7-4		
					8-13	13'	Stiff silty clay and clayey silt, little fine sand.
	S-7	13'-15'	24"	22"	7-8		
15'					9-18	15'	Dense medium to fine sand and gravel, little clay, trace silt.
	S-8	15'-17'	24"	8"	14-19		
					22-30		
	S-9	17'-19'	24"	17"	24-24		
					20-25		
20'	S-10	19'-21'	24"	21"	8-12		
					10-12		
	S-11	21'-23'	24"	20"	15-10		
					15-12		
25'						25'	Stiff to very stiff silty clay.
	S-12	25'-27'	24"	18"	4-8		
					6-14		
	S-13	27'-29'	24"	20"	8-11		
					15-13	29'	Required depth.
30'							

DRILLER: R. Mallardo **HELPER:** P. Michaud **INSPECTOR:** J. Bode

REMARKS: Well at 21'.
10' slotted, 11' riser, 1 road box, 3 bags cement grout, 3 pails of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-5-89
DATE END
1-5-89
SHEET 1 **OF** 1

BORING #
B-18 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-5-89	17'	well @ 23'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, silt, gravel, red brick.
	S-1	1'-3'	24"	12"	19-26		
					28-21		
	S-2	3'-5'	24"	20"	10-7	4'	Medium dense fine sand, little medium sand, trace fine gravel.
5'					2-3		
	S-3	5'-7'	24"	12"	5-5		
					6-9		
	S-4	7'-9'	24"	15"	9-11		
					16-21		
10'	S-5	9'-11'	24"	18"	11-10		
					4-4		
	S-6	11'-13'	24"	22"	5-6		
					7-17	13'	Very stiff clayey silt, trace fine sand.
	S-7	13'-15'	24"	24"	7-8		
					8-21	15'	Dense coarse to fine sand and gravel.
15'	S-8	15'-17'	24"	10"	43-60		
					16-14		
	S-9	17'-19'	24"	10"	11-19		
					20-26		
20'	S-10	20'-22'	24"	18"	23-10		
					21-16		
	S-11	22'-24'	24"	12"	10-10	23'	Stiff silty clay.
					18-33		
25'	S-12	24'-26'	24"	15"	15-8		
					6-8		
	S-13	26'-28'	24"	8"	8-9		
					6-7	28'	Required depth.
30'							

DRILLER: R. Mallardo **HELPER:** P. Michaud **INSPECTOR:** J. Bode

REMARKS: Well installed at 23'.
10' slotted, 13' riser, 1 road box, 3 bags cement grout, 3 bags of silica sand, 1 pail of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-12-89
DATE END
1-12-89
SHEET 1 **OF** 2

BORING #
B-19 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-12-89	17'	well@ 23'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
							Fill: sand, gravel, cinders, cobbles red brick, silt, clay.
	S-1	1'-3'	24"	20"	25-16		
					9-9		
	S-2	3'-5'	24"	6"	12-9		
					23-100/2"		
5'	S-3	5'-7'	24"	20"	18-20		
					25-31		
	S-4	7'-9'	24"	16"	29-32		
					19-11		
	S-5	9-'11'	24"	20"	18-13		
10'					25-63		
	S-6	11'-13'	24"	20"	58-28		
					25-38		
	S-7	13'-15'	24"	24"	31-43		
					39-34	15'	Very dense medium to fine sand and gravel.
15'	S-8	15'-17'	24"	12"	26-46		
					27-18		
	S-9	17'-19'	24"	20"	21-18		
					20-26		
						20'	Hard silty clay, medium to fine sand layers.
20'	S-10	20'-22'	24"	22"	5-9		
					13-13		
	S-11	22'-24'	24"	24"	9-10		
					23-16		
	S-12	24'-26'	24"	24"	8-9		
25'					26-15	26'	Medium dense coarse to fine sand, clay layers.
	S-13	26'-28'	24"	20"	10-9		
					14-11	28'	Stiff silty clay.
	S-14	28'-30'	24"	18"	3-6		
30'					8-11		

DRILLER: P. Michaud **HELPER:** G. Leavitt **INSPECTOR:** J. Bode

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

PROJECT: Parcel 18 & 18B
Boston, MA
PROJECT #: 10003-41
DATE START: 1-12-89
DATE END: 1-12-89
SHEET 2 OF 2
BORING #: B-I9 OW
LOCATION: See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

"GROUNOWATER OBSERVATIONS"

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-15	30'-32'	24"	18"	3-5		Stiff silty clay.
					2-3	32'	Required depth.
35'							Well at 23'.

DRILLER: P. Michaud HELPER: G. Leavitt INSPECTOR: J. Bode

REMARKS: 10' slotted, 13' riser, 1 raod box, 3 bags cement grout, 3 bags of silica sand, 2 palls of bentonite pellets.

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-13-89
DATE END
1-13-89
SHEET 1 **OF** 2

BORING #
B-20 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.
1-13-89	16'	well @ 22'	Upon completion

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-1	1'-3'	24"	14"	7-8		Fill: sand, gravel, silt, red brick, glass, cinders.
					18-25		
	S-2	3'-3'1"	1"	1"	100/1"		
5'							
	S-3	5'-7'	24"	12"	12-12		
					12-10		
	S-4	7'-9'	24"	10"	11-18		
					12-13		
10'	S-5	9'-11'	24"	23"	10-37		
					50-50		
	S-6	11'-13'	24"	20"	85-54		
					48-42		
	S-7	13'-15'	24"	20"	49-45		
					39-28	15'	Dense medium to fine sand, occasional silty clay layers.
15'	S-8	15'-17'	24"	24"	18-23		
					26-23		
	S-9	17'-19'	24"	24"	16-12		
					15-14		
20'	S-10	20'-22'	24"	22"	19-19		
					22-23		
	S-11	22'-24'	24"	24"	33-57		
					37-44		
	S-12	24'-26'	24"	18"	10-33		
25'					27-24		
						27'	Stiff silty clay.
	S-13	28'-30'	24"	18"	5-7		
					7-7		
30'							

DRILLER: P. Michaud **HELPER:** G. Leavitt **INSPECTOR:** J. Bode

REMARKS:

BORING LOG

NEW HAMPSHIRE BORING
P.O. BOX 165
DERRY, NH 03038

Parcel 18 & 18B
PROJECT
Boston, MA
PROJECT #
10003-41
DATE START
1-13-89
DATE END
1-13-89
SHEET 2 **OF** 2

BORING #
B-20 OW
LOCATION
See plan

	CASING	SAMPLER
TYPE:	H-S-A	SS
SIZE:	4 1/4" I.D.	1 3/8" I.D.
HAMMER:		140 lbs.
FALL:		30"

GROUNDWATER OBSERVATIONS

DATE	DEPTH	CASING	STABILIZATION PER.

DEPTH	SAMPLE #	SAMPLE DEPTH	PENETRATION	RECOVERY	BLOWS/6"	STRATA CHANGE	SAMPLE DESCRIPTION
	S-14	30'-32'	24"	24"	5-5		Stiff silty clay.
					6-4	32'	Required depth.
							Well at 22'.
35'							
40'							

DRILLER: P. Michaud **HELPER:** G. Leavitt **INSPECTOR:** J. Bode

REMARKS: 10' slotted, 12' riser, 1 road box, 3 bags of cement, 3 bags of silica sand, 2 pails of bentonite pellets.

Appendix E

APPENDIX E

Groundwater Observation Well Installation Reports

Halay & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

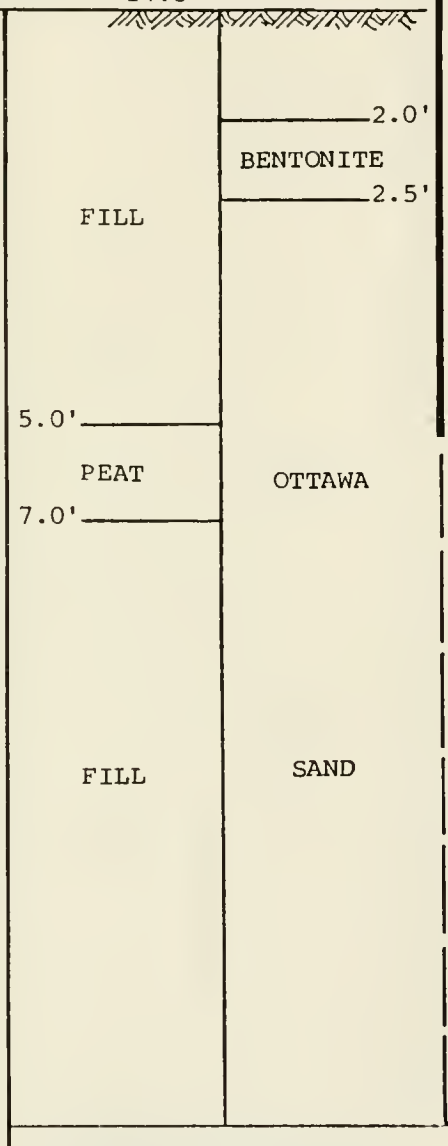
WELL NO. P18-1(OW)
FILE NO. 10003-00

PROJECT PARCEL 18 - RUGGLES & TREMONT STREETS
LOCATION BOSTON, MA
CLIENT METROPOLITAN/COLUMBIA PLAZA VENTURES
CONTRACTOR GUILD DRILLING CO., INC.
DRILLER C. O'DONNEL

BORING NO. B18-1A
LOCATION BOSTON, MA
SEE PLAN
INSTALLATION DATE 26 JULY 88
H&A REP W. RUBIK

SURVEY DATUM NGVD
GROUND ELEVATION 14.3

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
~~ELEVATION~~ OR STICKUP ~~ABOVE~~ BELOW GROUND SURFACE OF RISER PIPE	1.0 in.
THICKNESS OF SURFACE SEAL	6.0 in.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Ottawa Sand
DIAMETER OF BOREHOLE	4.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF RISER	
TYPE OF POINT OR MANUFACTURER	Machine Slotted PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Ottawa Sand
~~ELEVATION~~ DEPTH OF BOTTOM OF POINT	19.0 ft.
~~ELEVATION~~ DEPTH OF BOTTOM OF BOREHOLE	19.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. (LENGTH OF CASING (L_3))] [4.0 ft. (LENGTH OF RISER PIPE (L_1)) + 15.0 ft. (LENGTH OF POINT (L_2)) = 19.0 ft. (PAY LENGTH)]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

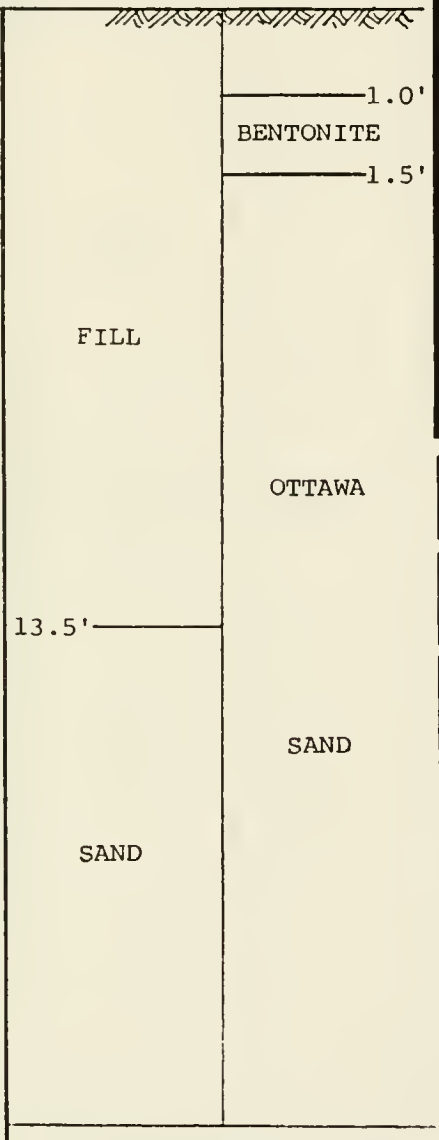
WELL NO. P18-2(OW)
FILE NO. 10003-00

PROJECT PARCEL 18 - RUGGLES & TREMONT STREETS
LOCATION BOSTON, MA
CLIENT METROPOLITAN/COLUMBIA PLAZA VENTURES
CONTRACTOR GUILD DRILLING CO., INC.
DRILLER C. O'DONNEL

BORING NO. P18-2
LOCATION BOSTON, MA
SEE PLAN
INSTALLATION DATE 26 JULY 88
H&A REP W. RUBIK

SURVEY DATUM NGVD
GROUND ELEVATION 15.1

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



~~ELEVATION~~ OR STICKUP ABOVE/~~BELOW~~ GROUND SURFACE OF CASING OR ROADWAY BOX	11.0 in.
~~ELEVATION~~ OR STICKUP ~~ABOVE~~ BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	6.0 in.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF CASING	13.0 in.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Ottawa Sand
DIAMETER OF BOREHOLE	4.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF RISER	2.5 ft.
TYPE OF POINT OR MANUFACTURER	Machine Slotted PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Ottawa Sand
~~ELEVATION~~ DEPTH OF BOTTOM OF POINT	17.5 ft.
~~ELEVATION~~ DEPTH OF BOTTOM OF BOREHOLE	19.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [2.5 ft. LENGTH OF RISER PIPE (L_1) + 15.0 ft. LENGTH OF POINT (L_2) = 17.5 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

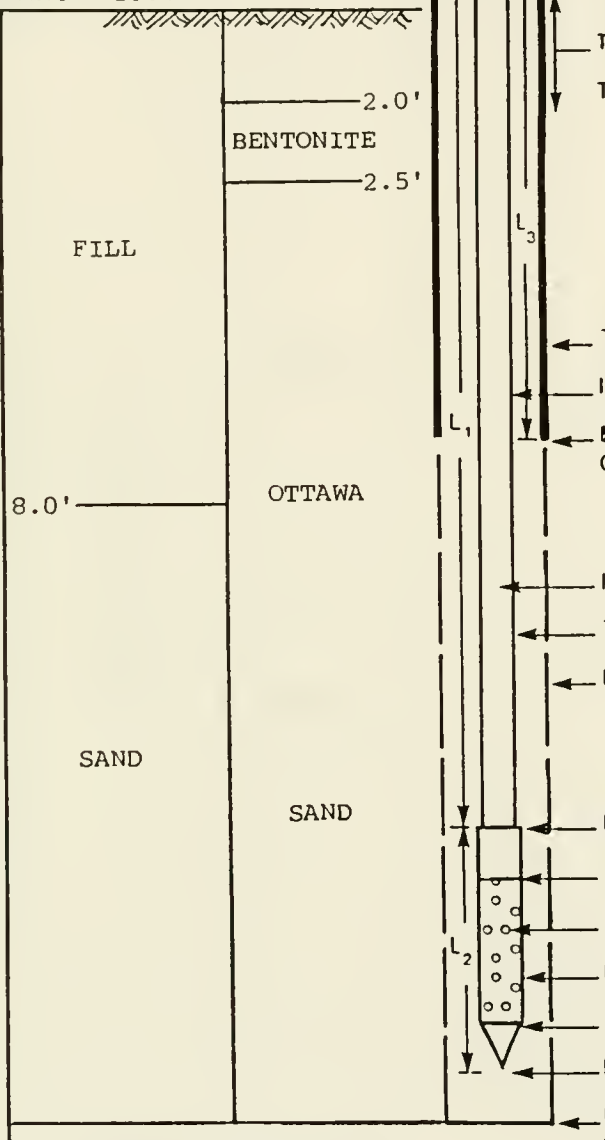
WELL NO. P18-3(OW)
FILE NO. 10003-00

PROJECT PARCEL 18 - RUGGLES & TREMONT STREETS
LOCATION BOSTON, MA
CLIENT METROPOLITAN/COLUMBIA PLAZA VENTURES
CONTRACTOR GUILD DRILLING CO., INC.
DRILLER C. O'DONNEL

BORING NO. P18-3A
LOCATION BOSTON, MA
SEE PLAN
INSTALLATION DATE 19 JULY 88
H&A REP A. BARJOSEF

SURVEY DATUM NGVD
GROUND ELEVATION 16.4

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
~~ELEVATION~~ OR STICKUP ~~ABOVE~~ BELOW GROUND SURFACE OF RISER PIPE	1.0 in.
THICKNESS OF SURFACE SEAL	6.0 in.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Ottawa Sand
DIAMETER OF BOREHOLE	4.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF RISER	
TYPE OF POINT OR MANUFACTURER	Machine Slotted PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Ottawa Sand
~~ELEVATION~~ DEPTH OF BOTTOM OF POINT	19.0 ft.
~~ELEVATION~~ DEPTH OF BOTTOM OF BOREHOLE	19.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [4.0 ft. LENGTH OF RISER PIPE (L_1) + 15.0 ft. LENGTH OF POINT (L_2) = 19.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Halay & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

WELL NO. P18-4(OW)
FILE NO. 10003-00

PROJECT PARCEL 18 - RUGGLES & TREMONT STREETS
LOCATION BOSTON, MA
CLIENT METROPOLITAN/COLUMBIA PLAZA VENTURES
CONTRACTOR GUILD DRILLING CO., INC.
DRILLER B. DUNPHY

BORING NO. P18-4A
LOCATION BOSTON, MA
SEE PLAN
INSTALLATION DATE 20 JULY 88
H&A REP W. RUBIK

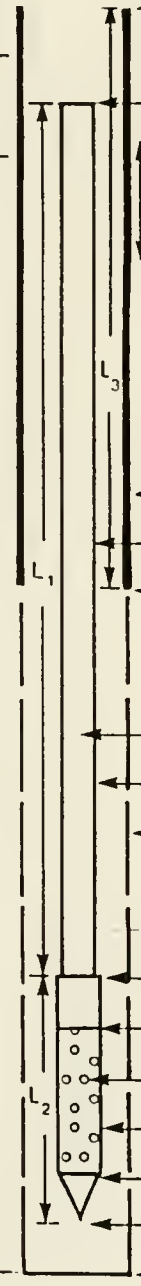
SURVEY DATUM NGVD

GROUND ELEVATION 14.6

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)

For soil condition, See Boring P18-4

OTTAWA SAND



Bottom of Exploration at 19.0 ft.

ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
~~ELEVATION~~ OR STICKUP ~~ABOVE~~ BELOW GROUND SURFACE OF RISER PIPE	4.0 in.
THICKNESS OF SURFACE SEAL	---
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	---
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Ottawa Sand
DIAMETER OF BOREHOLE	4.0 in.
~~ELEVATION~~ DEPTH OF BOTTOM OF RISER	4.0 ft.
TYPE OF POINT OR MANUFACTURER	Machine Slotted PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Ottawa Sand
~~ELEVATION~~ DEPTH OF BOTTOM OF POINT	19.0 ft.
~~ELEVATION~~ DEPTH OF BOTTOM OF BOREHOLE	19.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. (LENGTH OF CASING (L_3))] [4.0 ft. (LENGTH OF RISER PIPE (L_1)) + 15.0 ft. (LENGTH OF POINT (L_2)) = 19.0 ft. (PAY LENGTH)]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

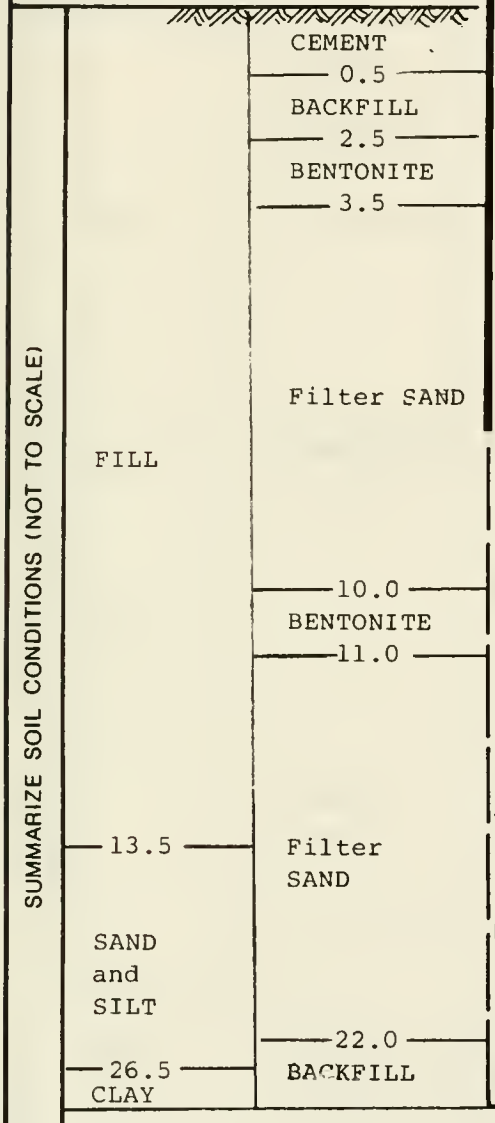
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B1-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR GUILD DRILLING
DRILLER PETER BROWN

BORING NO. B1
LOCATION See Plan
INSTALLATION DATE 4 OCT 88
H&A REP S. Kelly

SURVEY DATUM NGVD
GROUND ELEVATION 14.3



SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)

ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	1.0 ft. Cement/
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Filter Sand
DIAMETER OF BOREHOLE	6.5 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	12.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	22.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	30.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

Form 59 Rev. Feb. 88

[2.0 ft. LENGTH OF CASING (L_3)] [12.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 22.0 ft. PAY LENGTH]

Haley & Aldrich, Inc.

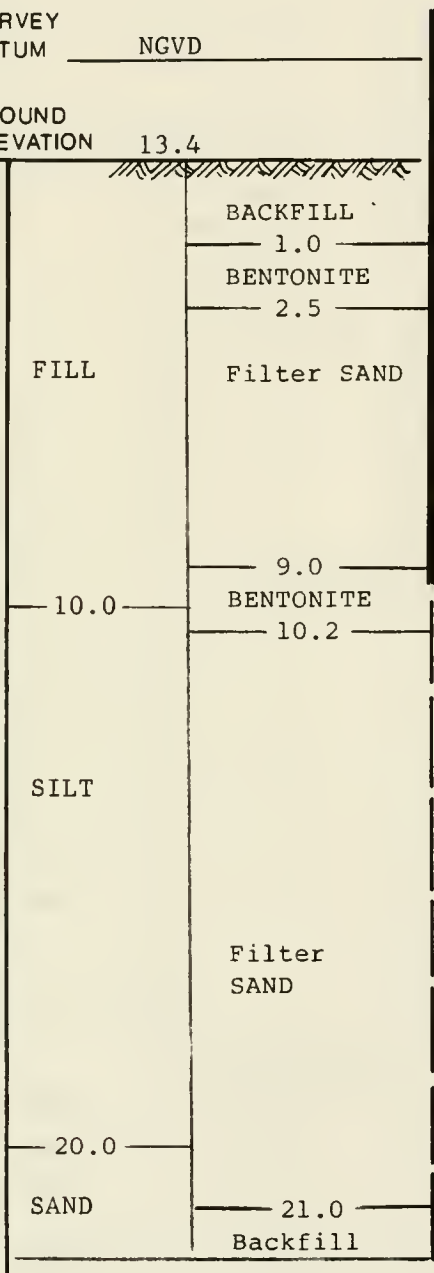
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B2B-GW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR GUILD DRILLING
DRILLER P. BROWN

BORING NO. B2B
LOCATION See Plan
INSTALLATION DATE 5 OCT 88
H&A REP S. Kelly

SURVEY DATUM NGVD
GROUND ELEVATION 13.4



SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)

ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	1.0 ft.
TYPE OF SURFACE SEAL	Bentonite
[INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	
TYPE OF CASING	Roadway box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Filter Sand
DIAMETER OF BOREHOLE	9.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	11.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	21.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	32.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [11.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 22.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

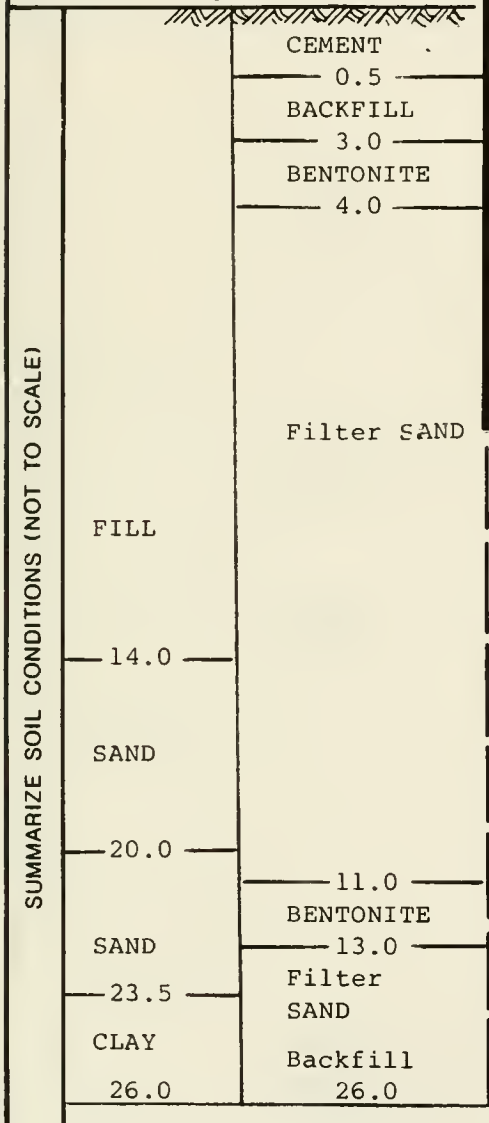
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B3-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR GUILD DRILLING CO.
DRILLER P. BROWN

BORING NO. B3
LOCATION See Plan
INSTALLATION DATE 7 OCT 88
H&A REP S. Kelly

SURVEY DATUM NGVD
GROUND ELEVATION 16.0



SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)

ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	1.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	cement/ bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Filter Sand
DIAMETER OF BOREHOLE	9.0 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	14.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	24.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	26.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [14.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 24.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

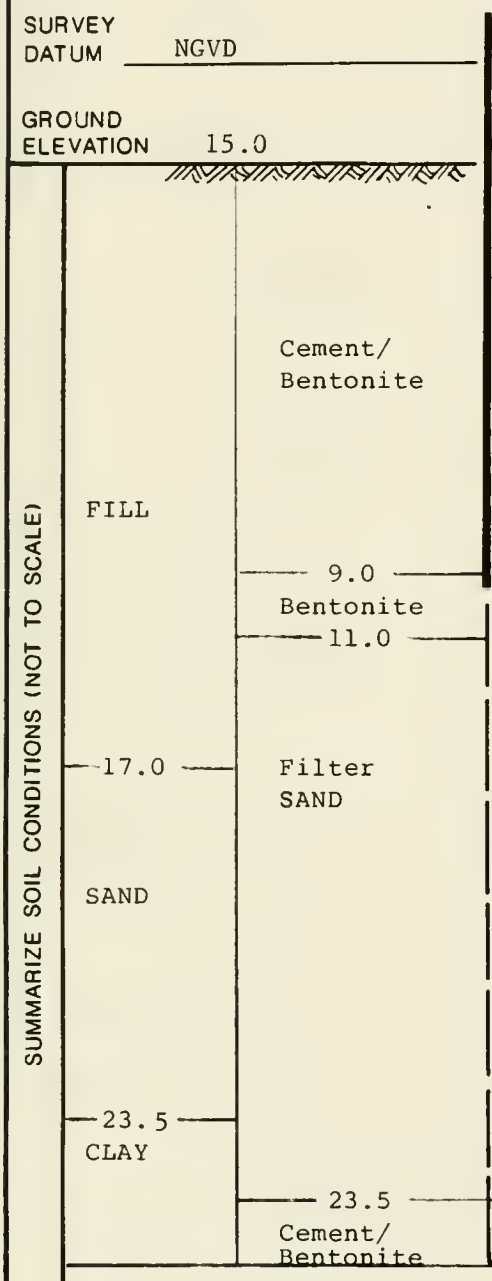
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B3B-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER ROGER BURNS

BORING NO. B3D
LOCATION See Plan
INSTALLATION DATE 3 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 15.0



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ~~ABOVE~~/BELOW GROUND SURFACE OF RISER PIPE	6.0 in.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ ~~Bentonite~~
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	23.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	28.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

2.0 ft.	13.0 ft.	+ 10.0 ft.	= 23.0 ft.
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	LENGTH OF POINT (L_2)	PAY LENGTH

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

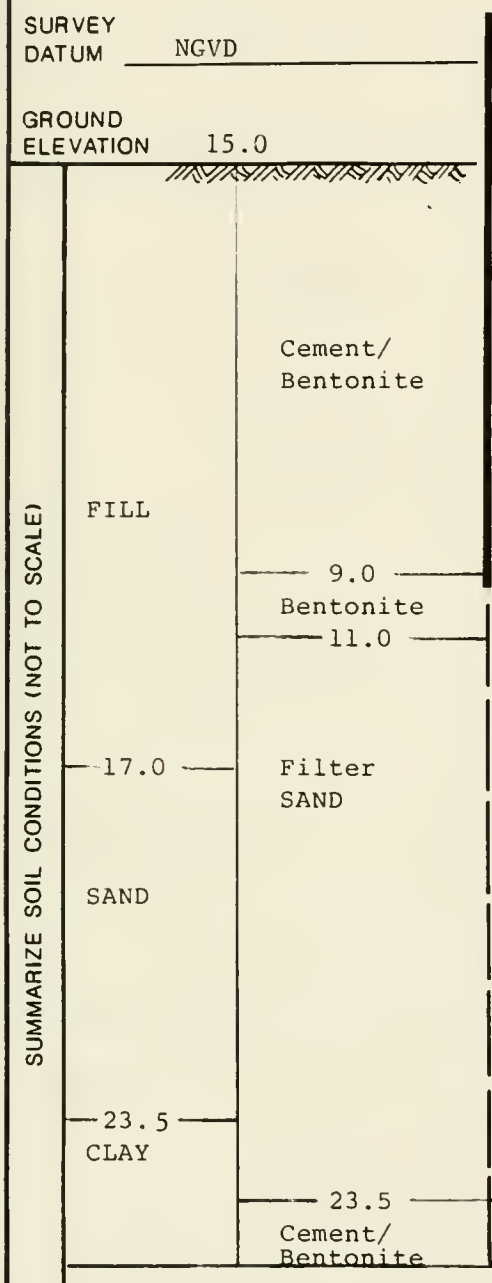
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B3B-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER ROGER BURNS

BORING NO. B3B
LOCATION See Plan
INSTALLATION DATE 3 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 15.0



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ~~ABOVE/BELOW~~ GROUND SURFACE OF RISER PIPE	6.0 in.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ ~~Bentonite~~
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	23.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	28.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [13.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 23.0 ft. PAY LENGTH]

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Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

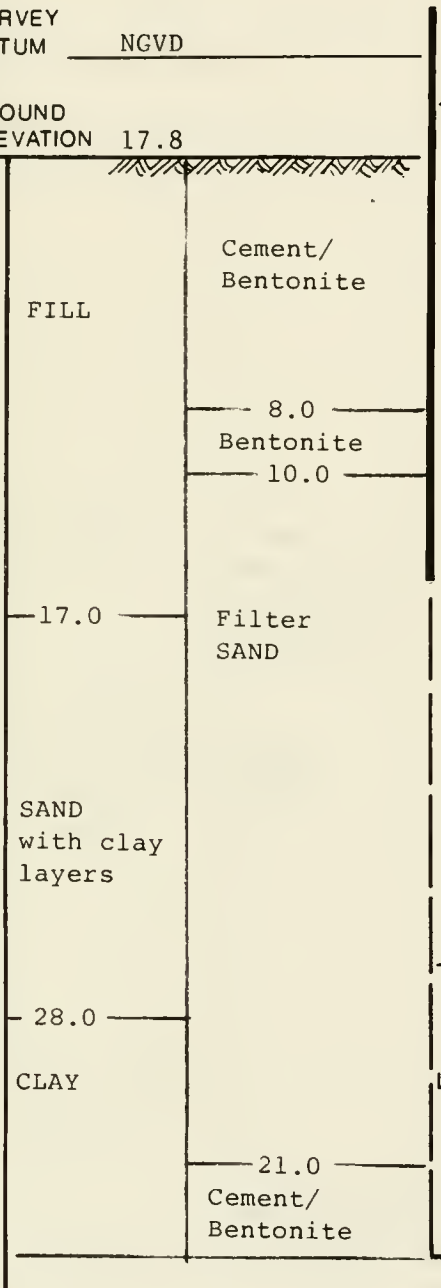
WELL NO. B4-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB . MALARDO

BORING NO. B4
LOCATION See Plan
INSTALLATION DATE 20 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 17.8

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	8.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	3.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	11.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	21.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	32.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

3.0 ft.	11.0 ft.	+ 10.0 ft.	= 21.0 ft.	
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	LENGTH OF POINT (L_2)	PAY LENGTH	

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Haley & Aldrich, Inc.

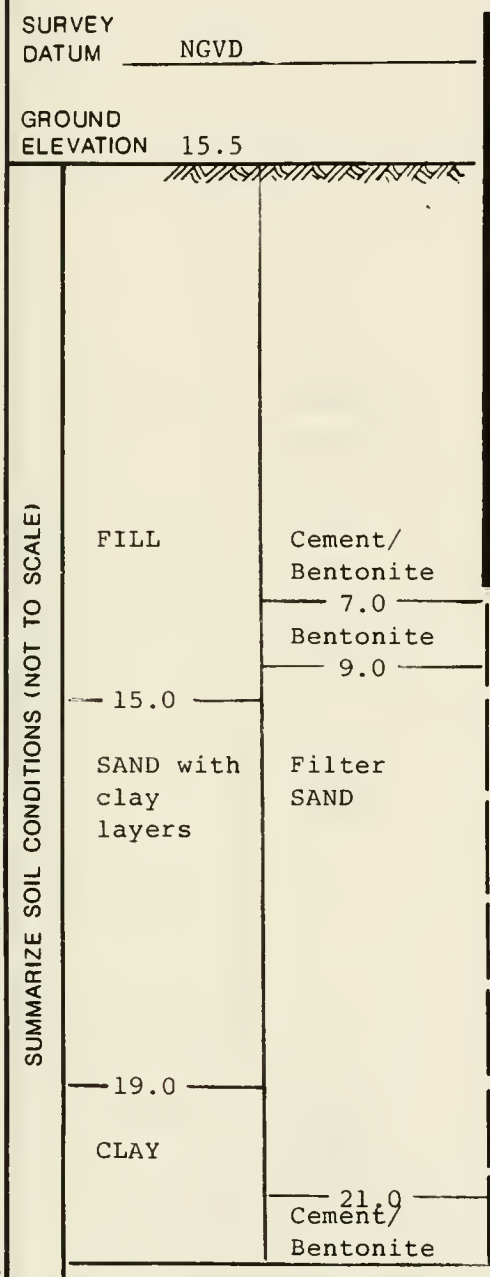
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B5-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B5
LOCATION See Plan
INSTALLATION DATE 20 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 15.5



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	7.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	11.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	21.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	23.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

2.0 ft.	11.0 ft.	+ 10.0 ft.	=	21.0 ft.
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	LENGTH OF POINT (L_2)		PAY LENGTH

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Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

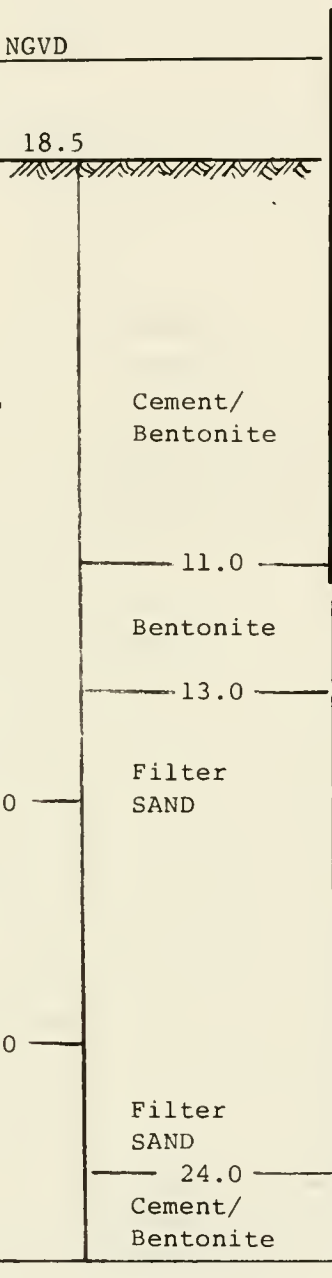
WELL NO. B6-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B6
LOCATION See Plan
INSTALLATION DATE 21 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 18.5

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	11.0 ft.
TYPE OF SURFACE SEAL	Cement/ Bentonite
[INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	14.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	24.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	29.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

2.0 ft.	14.0 ft.	+ 10.0 ft.	=	24.0 ft.
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	LENGTH OF POINT (L_2)		PAY LENGTH

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Haley & Aldrich, Inc.

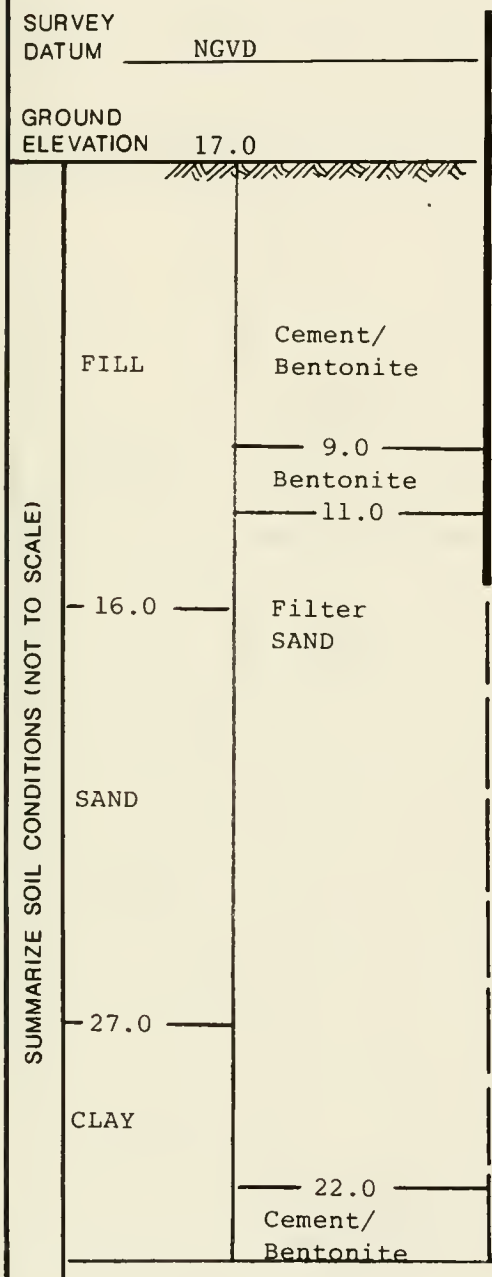
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B7-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B7
LOCATION See Plan
INSTALLATION DATE 22 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 17.0



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Filter Sand
DIAMETER OF BOREHOLE	8.0 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	11.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	21.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	32.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

2.0 ft.	11.0 ft.	+ 10.0 ft.	=	21.0 ft.
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	LENGTH OF POINT (L_2)		PAY LENGTH

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

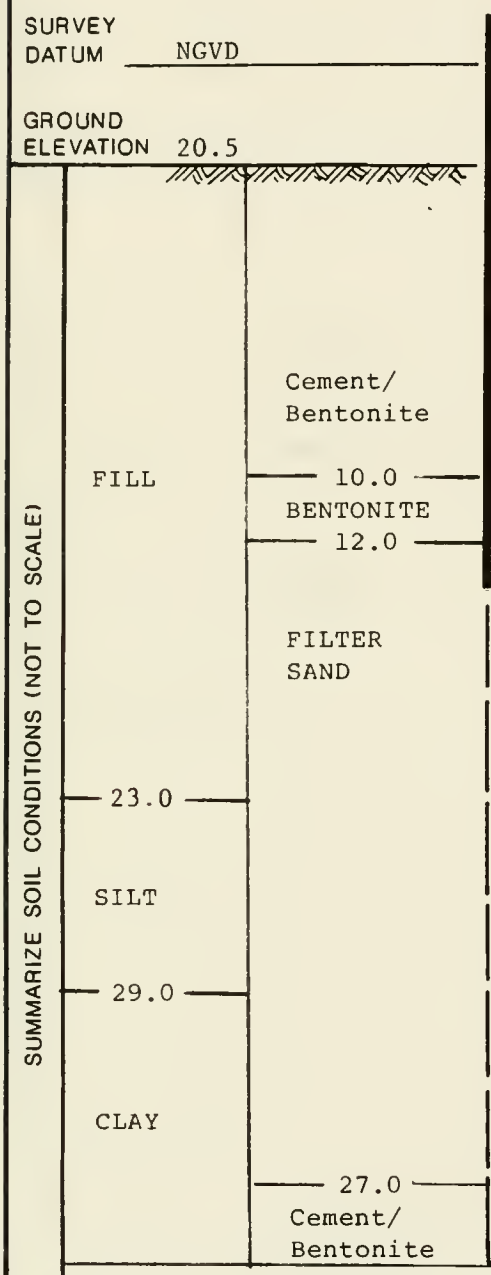
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B8-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B8
LOCATION See Plan
INSTALLATION DATE 23 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 20.5



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	6.0 in.
THICKNESS OF SURFACE SEAL	10.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ ~~Bentonite~~
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	15.5 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	25.5 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	33.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [15.5 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 25.5 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

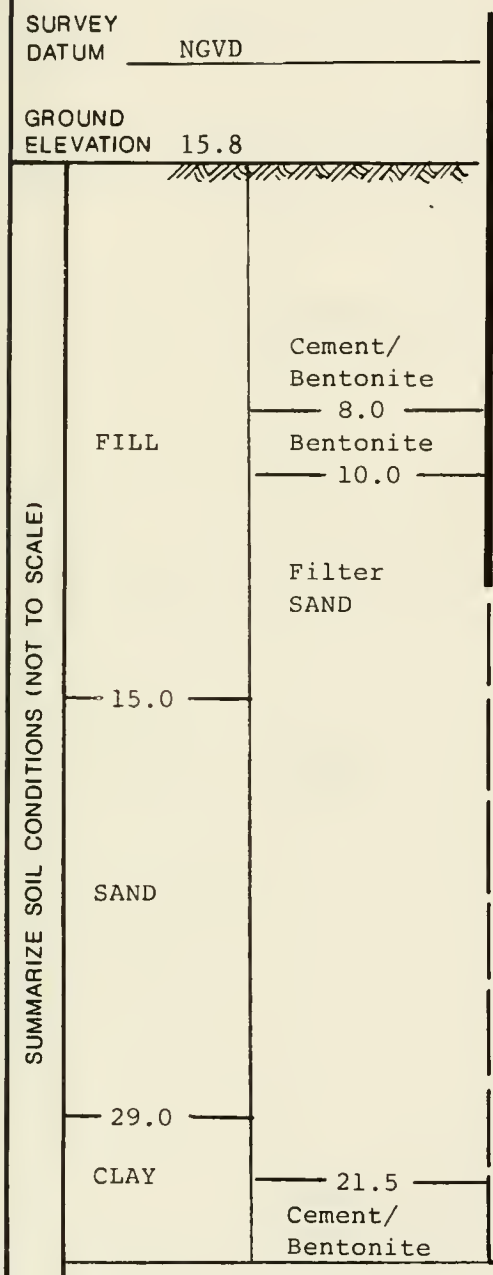
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B9-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B9
LOCATION See Plan
INSTALLATION DATE 11 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 15.8



ELEVATION OR STICKUP ABOVE/~~BELOW~~ GROUND SURFACE OF CASING OR ROADWAY BOX	3.0 in.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	8.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ ~~Bentonite~~
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	1.8 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	1.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	21.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	34.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

2.0 ft.	11.0 ft.	+ 11.0 ft.	= 22.0 ft.
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	LENGTH OF POINT (L_2)	PAY LENGTH

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

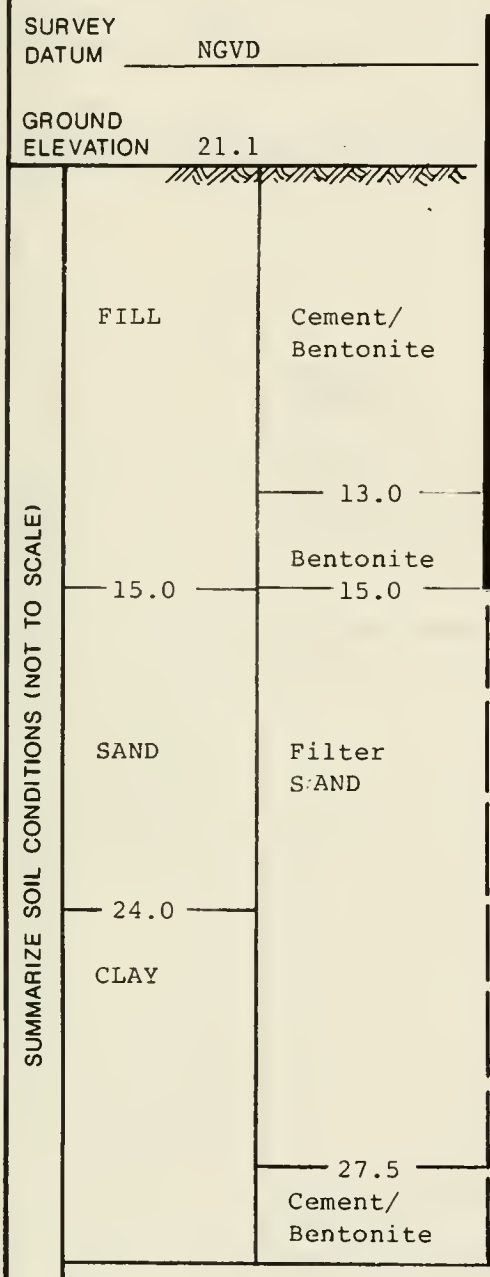
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B10-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B10
LOCATION See Plan
INSTALLATION DATE 11 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 21.1



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	13.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ ~~Bentonite~~
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ ~~Bentonite~~
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	17.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	27.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	29.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

Form 59 Rev. Feb. 88

LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	+ LENGTH OF POINT (L_2)	= PAY LENGTH
2.0 ft.	17.0 ft.	10.0 ft.	27.0 ft.

Haley & Aldrich, Inc.

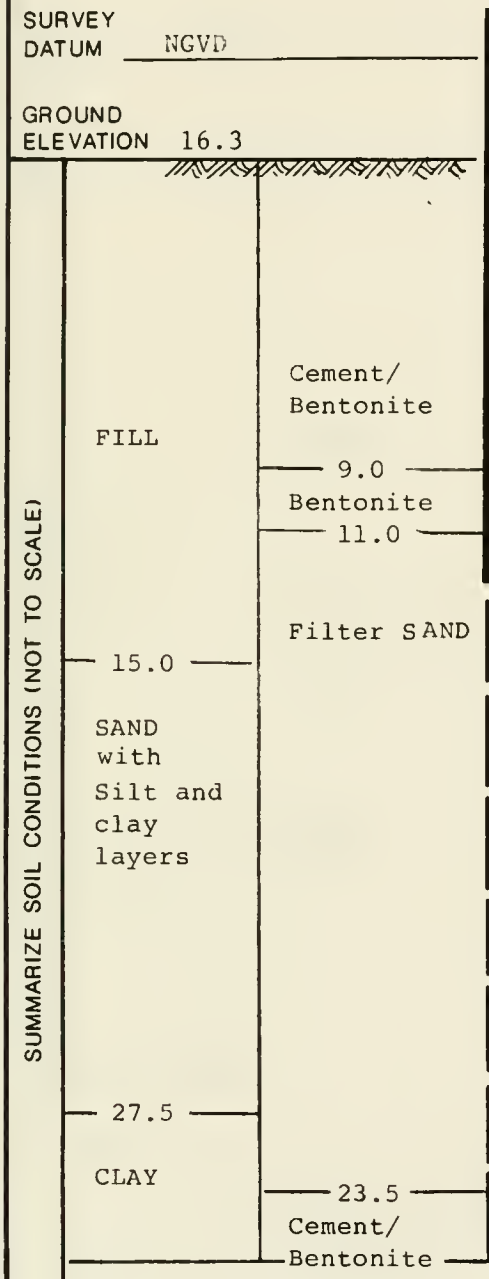
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B11-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B11
LOCATION See Plan
INSTALLATION DATE 10 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 16.3



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	23.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	32.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [13.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 23.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

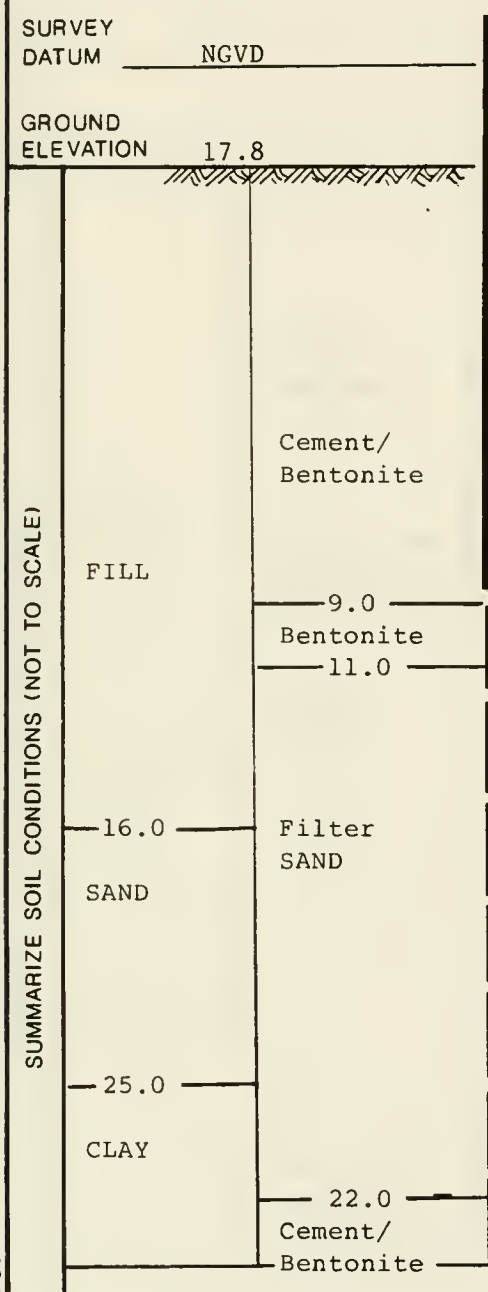
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B12-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B12
LOCATION See Plan
INSTALLATION DATE 28 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 17.8



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL	Cement/ Bentonite
[INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ ~~Bentonite~~
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	12.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	22.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	29.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

2.0 ft.	12.0 ft.	+	10.0 ft.	=	22.0 ft.
LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)		LENGTH OF POINT (L_2)		PAY LENGTH

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

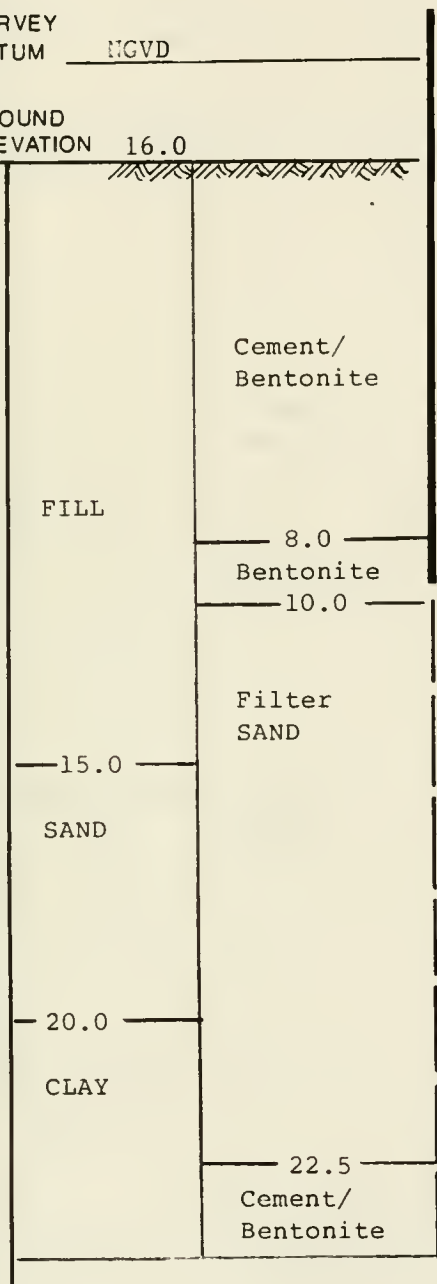
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B13-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B13
LOCATION See Plan
INSTALLATION DATE 29 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 16.0



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ~~XXXXX~~ ABOVE/BELOW GROUND SURFACE OF RISER PIPE	6.0 in.
THICKNESS OF SURFACE SEAL	8.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	12.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	22.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	24.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

LENGTH OF CASING (L_3)	LENGTH OF RISER PIPE (L_1)	+ LENGTH OF POINT (L_2)	= PAY LENGTH
2.0 ft.	12.0 ft.	10.0 ft.	22.0 ft.

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

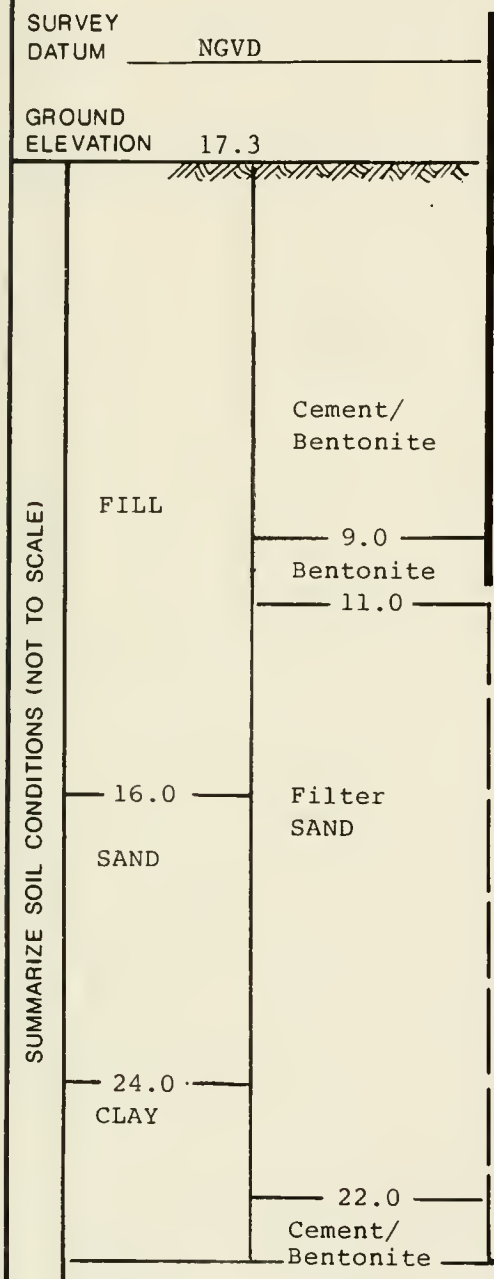
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B14-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B14
LOCATION See Plan
INSTALLATION DATE 28 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 17.3



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	9.0 ft. Cement/
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	12.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	22.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	28.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [12.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 22.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

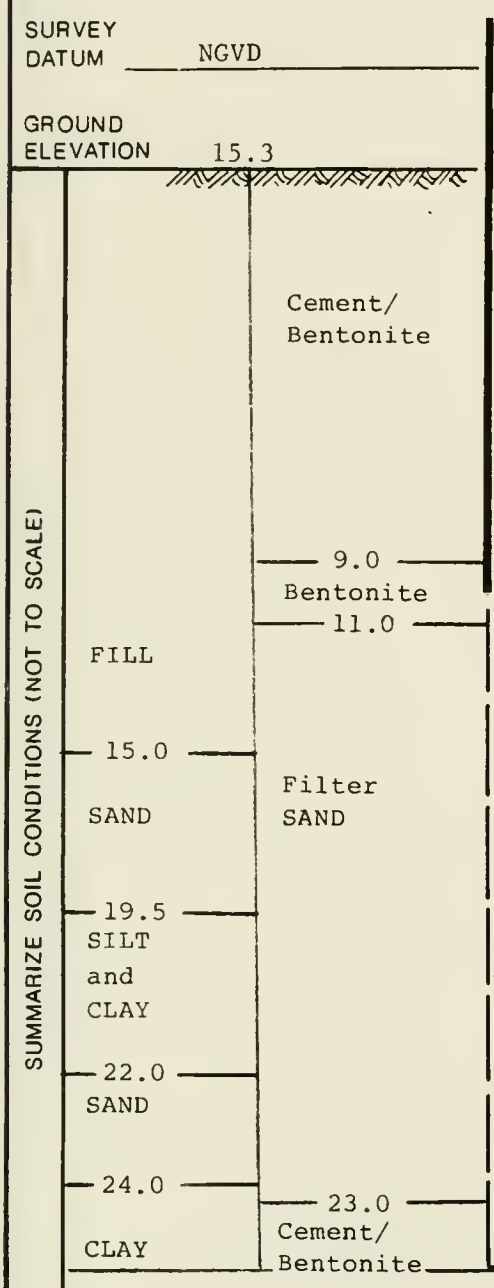
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B15-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER ROGER BURNS

BORING NO. B15
LOCATION See Plan
INSTALLATION DATE 30 DEC 88
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 15.3



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	23.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	28.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [13.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 23.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

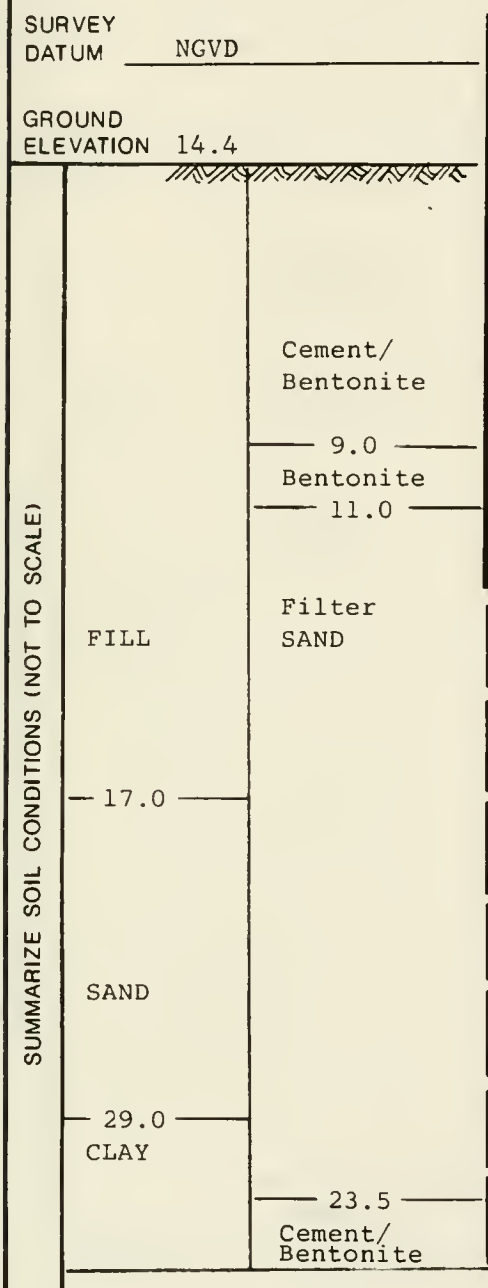
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B16-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER ROGER BURNS

BORING NO. B16
LOCATION See Plan
INSTALLATION DATE 4 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 14.4



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ~~ABOVE~~/BELOW GROUND SURFACE OF RISER PIPE	6.0 in.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	~~Cement/~~ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION/~~DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	~~Cement/~~ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION/~~DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION/~~DEPTH OF BOTTOM OF POINT	23.0 ft.
~~ELEVATION/~~DEPTH OF BOTTOM OF BOREHOLE	34.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [13.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 23.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

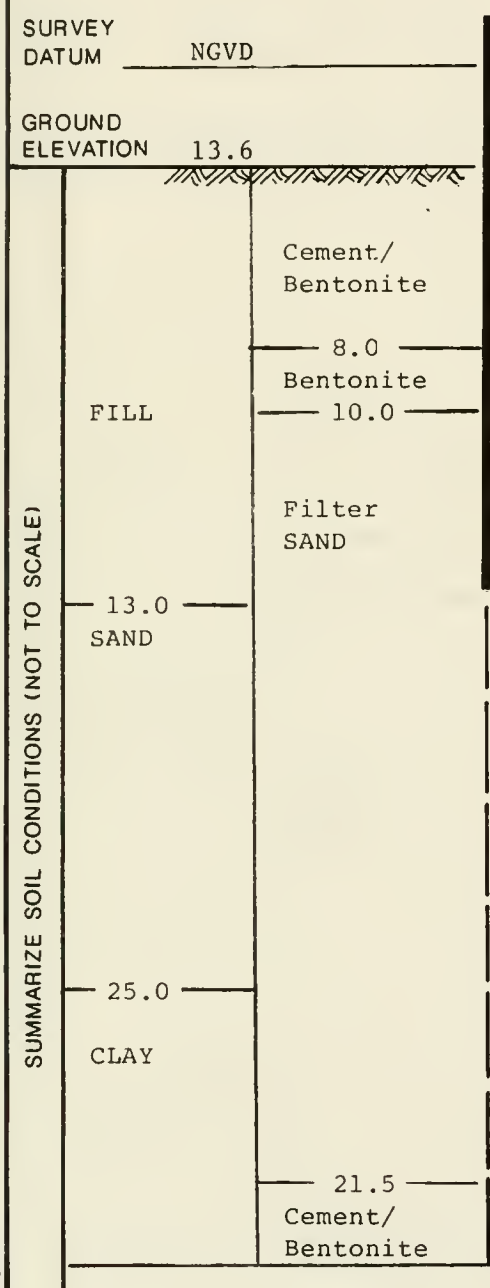
WELL NO. B17-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER BOB MALARDO

BORING NO. B17
LOCATION See Plan
INSTALLATION DATE 9 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 13.6

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



ELEVATION OR STICKUP ABOVE/~~BELOW~~ GROUND SURFACE OF CASING OR ROADWAY BOX	4.0 in.
ELEVATION OR STICKUP ABOVE/~~BELOW~~ GROUND SURFACE OF RISER PIPE	2.0 in.
THICKNESS OF SURFACE SEAL	8.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	~~Cement/~~ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	1.6 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	~~Cement/~~ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	11.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	21.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	29.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [11.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 21.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

GROUNDWATER OBSERVATION WELL REPORT

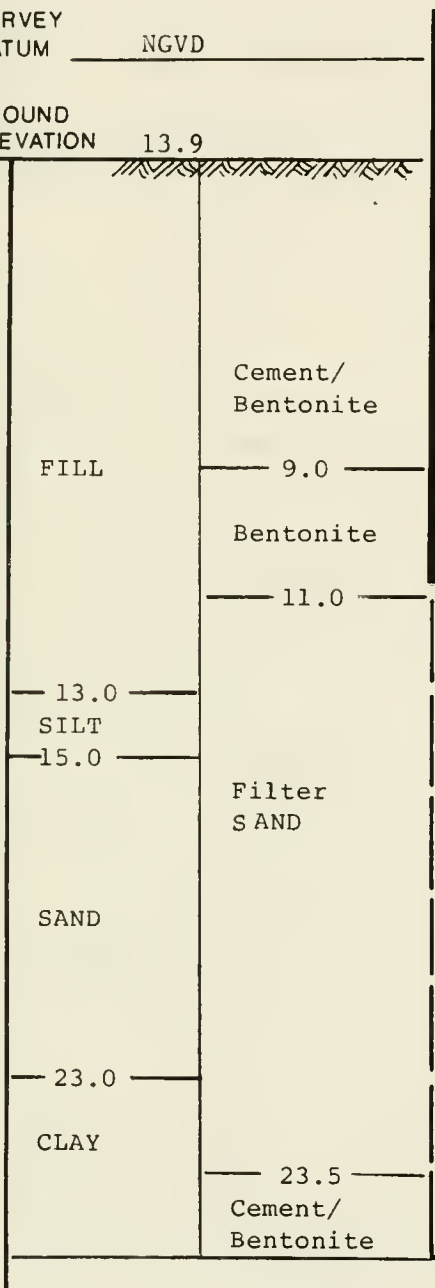
WELL NO. B18-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER ROGER BURNS

BORING NO. B18
LOCATION See Plan
INSTALLATION DATE 6 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 13.9

SUMMARIZE SOIL CONDITIONS (NOT TO SCALE)



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ~~XXXXXX~~ BELOW GROUND SURFACE OF RISER PIPE	6.0 in.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	~~Cement/~~ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~XXXXXXXX~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	~~Cement/~~ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~XXXXXXXX~~/DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~XXXXXXXX~~/DEPTH OF BOTTOM OF POINT	23.0 ft.
~~XXXXXXXX~~/DEPTH OF BOTTOM OF BOREHOLE	28.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [13.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 23.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

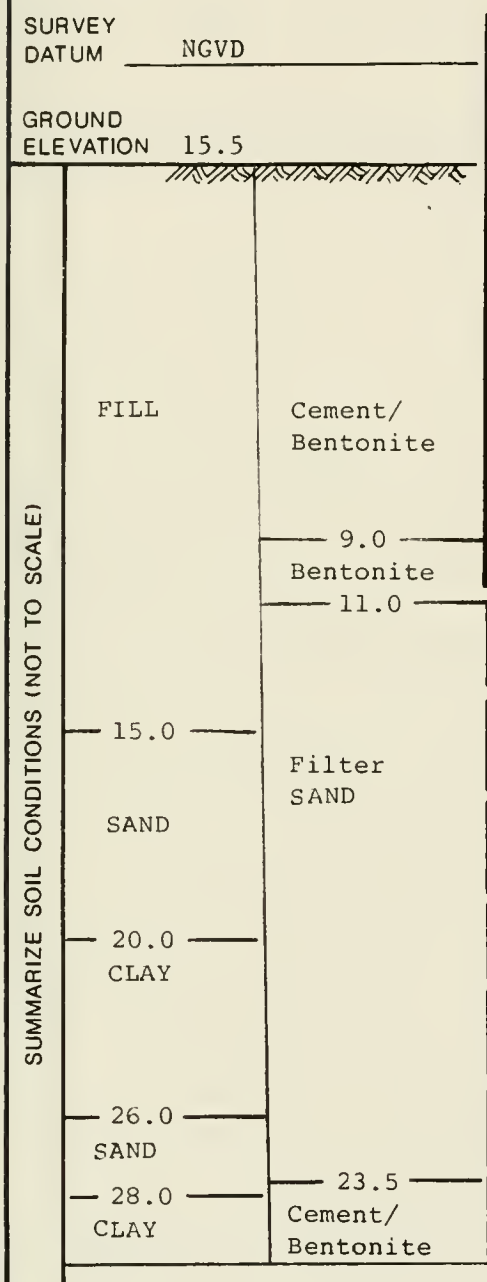
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B19-OW
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER PETER MICHAUD

BORING NO. B19
LOCATION See Plan
INSTALLATION DATE 12 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 15.5



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	9.0 ft.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	~~Cement/~~ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	~~Cement/~~ Bentonite
DIAMETER OF BOREHOLE	8.0 in.
~~ELEVATION~~/DEPTH OF BOTTOM OF RISER	13.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
~~ELEVATION~~/DEPTH OF BOTTOM OF POINT	23.0 ft.
~~ELEVATION~~/DEPTH OF BOTTOM OF BOREHOLE	32.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [13.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 23.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Haley & Aldrich, Inc.

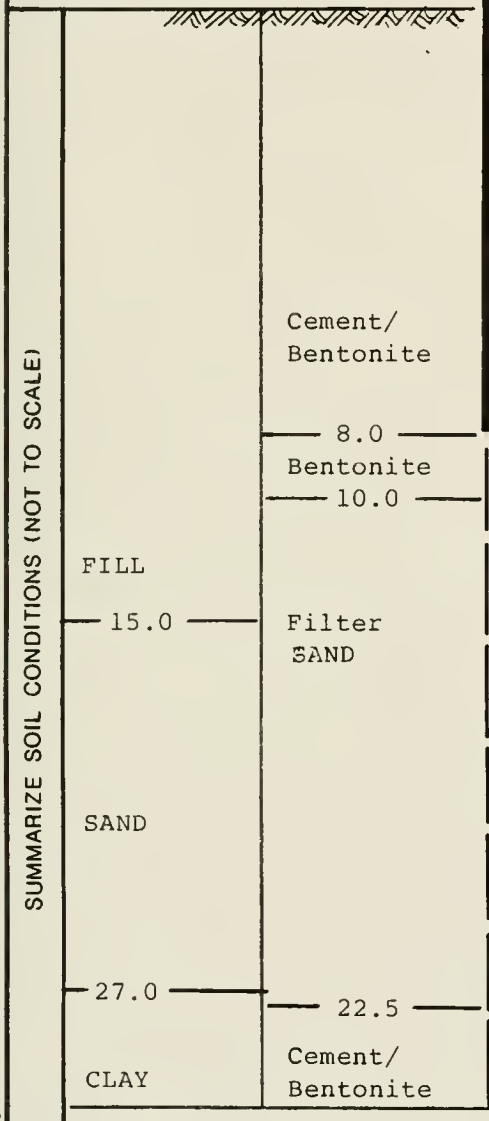
GROUNDWATER OBSERVATION WELL REPORT

WELL NO. B20-0W
FILE NO. 10003-41

PROJECT PARCEL 18
LOCATION BOSTON, MASSACHUSETTS
CLIENT F.R. HARRIS ENGINEERING
CONTRACTOR NEW HAMPSHIRE BORING
DRILLER PETER MICHAUD

BORING NO. B20
LOCATION See Plan
INSTALLATION DATE 13 JAN 89
H&A REP John Bode

SURVEY DATUM NGVD
GROUND ELEVATION 14.4



ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF CASING OR ROADWAY BOX	0.0 ft.
ELEVATION OR STICKUP ABOVE/BELOW GROUND SURFACE OF RISER PIPE	0.0 ft.
THICKNESS OF SURFACE SEAL	8.0 in.
TYPE OF SURFACE SEAL [INDICATE ALL SEALS SHOWING DEPTH, THICKNESS AND TYPE]	Cement/ Bentonite
TYPE OF CASING	Roadway Box
INSIDE DIAMETER OF CASING	3.0 in.
ELEVATION/DEPTH OF BOTTOM OF CASING	2.0 ft.
INSIDE DIAMETER OF RISER PIPE	2.0 in.
TYPE OF BACKFILL AROUND RISER	Cement/ ~~Bentonite~~
DIAMETER OF BOREHOLE	8.0 in.
ELEVATION/DEPTH OF BOTTOM OF RISER	12.0 ft.
TYPE OF POINT OR MANUFACTURER	PVC
SCREEN GAUGE OR SIZE OF OPENINGS	0.010 in.
DIAMETER OF WELLPOINT	2.0 in.
TYPE OF BACKFILL AROUND POINT	Filter Sand
ELEVATION/DEPTH OF BOTTOM OF POINT	22.0 ft.
ELEVATION/DEPTH OF BOTTOM OF BOREHOLE	32.0 ft.

[FIGURES REFER TO: EL. _____ DEPTH X]

[2.0 ft. LENGTH OF CASING (L_3)] [12.0 ft. LENGTH OF RISER PIPE (L_1) + 10.0 ft. LENGTH OF POINT (L_2) = 22.0 ft. PAY LENGTH]

Form 59 Rev. Feb. 88

Appendix F

APPENDIX F

Groundwater Monitoring Reports

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: P18-1(OW)

ELEVATION SUBTRAHEND 14.3 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	0939		14.6'	-0.3'		DTC
30 Jan. 89	1231		14.7'	-0.4'	Orange particles in suspension	BAM
9 Mar. 89	1110		14.7'	-0.4'	Turbid, rust-colored particles in suspension	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: P18-2(OW)

ELEVATION SUBTRAHEND 16.0 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	0925		16.4'	-0.4'		DTC
30 Jan. 89	1152		16.6'	-0.6'		BAM
8 Feb. 89	1240		Dry @ 18.0'			DMB
9 Mar. 89	1137		16.5'	-0.5'	Petroleum odor, sheen on water surface	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: P18-3(OW)

ELEVATION SUBTRAHEND 16.4 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	1014		16.4'	0.0'		DTC
30 Jan. 89	1116		16.3'	0.1'		BAM
7 Feb. 89	1250		16.5'	-0.1'		DMB
9 Mar. 89	0916		16.6'	-0.2'	Turbid, with brown particles	BAM

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HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: P18-4(OW)

ELEVATION SUBTRAHEND 14.6 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	1022		14.6'	0.0'		DTC
30 Jan. 89	1109		14.6'	0.0'		BAM
9 Mar. 89	*				*Not located, possibly under snow/ice	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B1-OW

ELEVATION SUBTRAHEND 14.3 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	0934		14.5'	-0.2'		DTC
30 Jan. 89	1223		12.4'	1.9'		BAM
9 Feb. 89	1233		12.2'	2.1'		DMB
9 Mar. 89	1117		12.0'	2.3'	Turbid, rust-colored particles in suspension	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B2B-OW

ELEVATION SUBTRAHEND 13.4 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	0946		14.5'	-1.1'		DTC
30 Jan. 89	1202		15.0'	-1.6'		BAM
8 Feb. 89	1237		15.0'	-1.6'		DMB
9 Mar. 89	1130		14.9'	-1.5'		BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B3-OW

ELEVATION SUBTRAHEND 16.0 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	1010		15.0'	1.0'		DTC
30 Jan. 89	1036		16.1'	-0.1'	Petroleum odor in well; sheen on bailer	BAM
9 Mar. 89	0910		16.1'	-0.1'	Turbid, tan-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B3B-OW

ELEVATION SUBTRAHEND 15.0 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1042		15.2'	-0.2'		BAM
7 Feb. 89	1255		15.3'	-0.3'	Petroleum odor	DMB
9 Mar. 89	*				*Did not locate	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B4-OW

ELEVATION SUBTRAHEND 17.8 NGVD

FILE NO. 10003-41
PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	1002		17.8'	0.0'		DTC
30 Jan. 89	1056		18.0'	-0.2'		BAM
7 Feb. 89	1229		18.1'	-0.3'		DMB
9 Mar. 89	1000		17.9'	-0.1'		BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B5-OW

ELEVATION SUBTRAHEND 15.5 NGVD

FILE NO. 10003-41

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DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	0957		15.5'	0.0'		DTC
30 Jan. 89	1138		15.7'	-0.2'	Petroleum odor	BAM
8 Feb. 89	1300		15.7'	-0.2'		DMB
9 Mar. 89	1010		15.5'	0.0'	Turbid, tan-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B6-OW

ELEVATION SUBTRAHEND 18.5 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
22 Dec. 88	0950		18.8'	-0.3'		DTC
30 Jan. 89	1143		18.8'	-0.3'	Slight sheen on water surface	BAM
9 Feb. 89	1242		18.9'	-0.4'		DMB
9 Mar. 89	1215		19.0'	-0.5'	Turbid, white-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B7-OW

ELEVATION SUBTRAHEND 17.0 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1124		17.3'	-0.3'	Sheen on bailer	BAM
8 Feb. 89	0903		17.4'	-0.4'	Petroleum odor, sheen on water	DMB
9 Mar. 89	1023		18.1'*	-1.1'	>1.0' amber-colored petroleum product	BAM
16 Mar. 89	0925		18.6'*	-1.6'	1.6' amber-colored petroleum product	DMB

*Water levels not corrected for influence of phase-separated petroleum product.

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B8-OW

ELEVATION SUBTRAHEND 20.5 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1236		21.2'	-0.7'		BAM
8 Feb. 89	1228		21.5'	-1.0'		DMB
9 Mar. 89	1056		21.3'	-0.8'	Turbid, rust-colored particles in suspension	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B9-OW

ELEVATION SUBTRAHEND 16.0 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1227		15.4'	0.6'		BAM
8 Feb. 89	1231		15.5'	0.5'		DMB
9 Mar. 89	1102		16.1'	-0.1'	Turbid, white-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B10-OW

ELEVATION SUBTRAHEND 21.1 NGVD

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DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1240		22.0'	-0.9'		BAM
8 Feb. 89	1225		21.7'	-0.6'		DMB
9 Mar. 89	1150		21.8'	-0.7'		BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B11-OW

ELEVATION SUBTRAHEND 16.3 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1148		17.0'	-0.7'	White colloid in suspension	BAM
9 Feb. 89	0904		17.0'	-0.7'		DMB
9 Mar. 89	1200		16.8'	-0.5'	Turbid, white-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B12-OW

ELEVATION SUBTRAHEND 17.8 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1025		17.9'	-0.1'		BAM
9 Mar. 89	0907		18.2'	-0.4'	Turbid, tan-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B13-OW

ELEVATION SUBTRAHEND 16.0 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1047		16.0'	0.0'		BAM
8 Feb. 89	1043		16.1'	-0.1'		DMB
9 Mar. 89	0923		15.9'	0.1'	Turbid, tan-colored	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B14-OW

ELEVATION SUBTRAHEND 17.3 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1052		17.2'	0.1'		BAM
9 Mar. 89	0940		17.5'	-0.2'	White particulate in suspension	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B15-OW

ELEVATION SUBTRAHEND 15.3 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1107		15.3'	0.0'		BAM
7 Feb. 89	1233		15.3'	0.0'		DTC
9 Mar. 89	0930		15.0'	0.3'	White and tan particulates in suspension	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B16-OW

ELEVATION SUBTRAHEND 14.4 NGVD

FILE NO. 10003-41
PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1103		14.5'	-0.1'	White colloid in suspension	BAM
7 Feb. 89	1231		14.6'	-0.2'	Slight petroleum odor	DMB
9 Mar. 89	0948		14.6'	-0.2'	White colloid in suspension	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B17-OW

ELEVATION SUBTRAHEND 13.9 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1206		14.5'	-0.6'		BAM
9 Mar. 89	1125		14.5'	-0.6'		BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B18-OW

ELEVATION SUBTRAHEND 13.9 NGVD

FILE NO. 10003-41

PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1156		14.4'	-0.5'	Sheen on bailer	BAM
9 Mar. 89	1144		14.3'	-0.4'	Petroleum odor, sheen on water surface	BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B19-OW

ELEVATION SUBTRAHEND 15.5 NGVD

FILE NO. 10003-41

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DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1129		17.2'	-1.7'		BAM
8 Feb. 89	0904		17.1'	-1.6'		DMB
9 Mar. 89	1030		17.0'	-1.5'		BAM

HALEY & ALDRICH, INC.
CAMBRIDGE, MASSACHUSETTS

GROUND WATER MONITORING REPORT

OW/PZ NUMBER: B20-OW

ELEVATION SUBTRAHEND 14.4 NGVD

FILE NO. 10003-41
PAGE NO.

DATE	TIME	ELAPSED TIME	DEPTH OF WATER FROM ROADWAY BOX	ELEVATION OF WATER	REMARKS	READ BY
30 Jan. 89	1133		16.2'	-1.8'		BAM
9 Mar. 89	1040		15.9'	-1.5'	Turbid, white-colored	BAM

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